

# Health Care Financing

## Research Report

End Stage Renal Disease, 1989



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Department of Health and Human Services  
Health Care Financing Administration  
Bureau of Data Management and Strategy

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## Research Report

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The Health Care Financing Administration (HCFA) was established to combine health care financing and quality assurance within a single agency. HCFA is responsible for the Medicare program, Federal participation in the Medicaid program, and a variety of other health care quality assurance programs.

The mission of HCFA is to promote the timely delivery of appropriate, quality health care to the beneficiaries of its programs—approximately 53 million of the Nation's aged, disabled, and poor. The agency must also ensure that program beneficiaries are aware of the services for which they are eligible, that those services are accessible and of high quality, and that agency policies and actions promote efficiency and quality within the total health care delivery system.

The Bureau of Data Management and Strategy (BDMS) operates HCFA's statistical data systems and maintains the national Medicare statistical files. BDMS also serves as the focal point within the agency for information systems policy, planning, and data standards development.

The Office of Research and Demonstrations (ORD) conducts studies and projects that demonstrate and evaluate optional reimbursement, coverage, eligibility, and management alternatives to the present Federal programs. In addition, ORD examines the impact of HCFA programs on health care status, utilization, and expenditures, as well as their effect on beneficiary access to services, health care providers, and the health care industry.

Health Care Financing Research Reports present the results of major studies and projects conducted by HCFA program staff. These reports contain significant findings that affect HCFA programs and are used as the basis for making program changes.

The *End Stage Renal Disease Research Report, 1989* reflects a wide range of data and analyses regarding the Medicare end stage renal disease program. This report emphasizes trends and comparisons over time, making it a standard reference source for illustrating changes in the nature of the Medicare end stage renal disease population and for examining the pattern of treatment for these patients.

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End Stage Renal Disease, 1989

**Department of Health and Human Services**  
Health Care Financing Administration  
Bureau of Data Management and Strategy  
Office of Research and Demonstrations  
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# End stage renal disease, 1989

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## Introduction

With the enactment of section 299I of Public Law 92-603 (1972 Amendments to the Social Security Act), full Medicare coverage was extended to persons with end stage renal disease (ESRD), effective July 1, 1973. To be eligible for Medicare benefits, the patient must first be currently or fully insured, or be eligible for Social Security benefits, or be the spouse or dependent child of such a person. Additionally, a physician must certify that the individual requires chronic dialysis or a kidney transplant to maintain life.

The Medicare program pays a prospectively determined amount for kidney transplants and for certain drug treatments and on a composite rate schedule for dialysis services. For example, immunosuppressive drugs prescribed for transplant recipients are covered by Medicare for 1 year following discharge from the hospitalization for the transplant. The drug, epoietin (EPO), used to combat anemia, was added to Medicare coverage effective June 1, 1989.

The Health Care Financing Administration (HCFA) is charged with the effective administration of Medicare benefits to eligible persons with ESRD. Integral to the effective management of the ESRD program is the operation of a comprehensive data base containing medical and demographic information for the Medicare ESRD population. This data base, along with other ESRD program-related data, is contained within the ESRD Program Management and Medical Information System (PMMIS). This system, as required by Public Law 95-292, section (c)(1)(A), is designed to serve the needs of the Department of Health and Human Services in support of program analysis, policy development, and epidemiological research. The ESRD PMMIS includes information both on Medicare ESRD beneficiaries and on Medicare-approved ESRD hospitals and dialysis facilities.

The principal sources of beneficiary-specific information are the Medicare billing records and incidence-specific medical information forms that report onset of ESRD, characteristics and status of a kidney transplant, and cause of death for an ESRD beneficiary. The principal sources of hospital and facility information are the Medicare certification approval notices and an annual survey of these organizations.

Legislation passed in 1986 mandated the establishment of a national ESRD patient registry. This registry, the United States Renal Data System (USRDS), is operated by a Coordinating Center (currently the Urban Institute) under contract with the National Institutes of Health (NIH). The USRDS is managed overall through the cooperative efforts of HCFA and NIH. Further, there are three major advisory committees which are composed of representatives from Federal agencies and professionals from the renal community; these are the Executive Committee, the Scientific Advisory Committee, and the Data Management Advisory Committee. Also, the Department of Health and Human Services (DHHS) has established the USRDS Data Advisory Committee to provide advice to the Secretary of DHHS in the formulation of policies and procedures relevant to the management, collection, and analyses of ESRD data.

The ESRD PMMIS maintained by HCFA provides the foundation data for the USRDS. However, it is planned that the USRDS will eventually include additional data and that the Coordinating Center will conduct focused studies on the causes, progression, and treatment of ESRD, and will disseminate a variety of reports based on these studies.

HCFA recognizes the need to disseminate the information developed from the ESRD PMMIS data and any resulting analyses of these data as promptly as possible. The purpose of this report is to present, in a single volume, statistics concerning recent trends in ESRD treatment and detailed discussions of selected health issues involving the ESRD population. Several of the tables in this report emphasize trends and comparisons over time, making this report a standard reference on the Medicare ESRD population and on ESRD treatment patterns.

Data which have been released to HCFA from other organizations (e.g., the Department of Veterans Affairs, the Centers for Disease Control, the European Dialysis and Transplantation Association, the Australia and New Zealand Dialysis and Transplant Registry, and the Canadian Renal Failure Register) have been included and identified where appropriate.



# Incidence and enrollment

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## Program incidence

Trends in Medicare ESRD program incidence (that is, the count of new enrollees), from 1983 to 1988 are described in this section. The new Medicare ESRD population is presented by age, sex, race, primary diagnosis, and State in the accompanying tables, along with some comparative data gathered from other Western countries on their ESRD populations.

The total counts of new Medicare ESRD beneficiaries by age, sex, race, and primary diagnosis are shown in Table 1. In 1983, 25,155 persons were added to the Medicare enrollment files as ESRD beneficiaries. By 1988, the annual number of new ESRD beneficiaries had increased to 36,743, representing an average annual increase of 7.9 percent. The incidence from 1987 to 1988 increased by only 7.2 percent, slightly lower than the 6-year average.

Older persons, in particular those over 65 years of age, comprised the largest and fastest growing age group of ESRD beneficiaries. Specifically, the largest average annual rate of growth was for persons 75 years of age or over (13.3 percent); also, the increase from 1987 to 1988 was largest for persons 75 years of age or over (11.4 percent). There was a decrease from 1987 to 1988 of 6.3 percent in cases for persons under 15 years of age. This is probably a temporary aberration, since all of the other data in the table reflect annual increases in incidence.

The average annual rate of increase was just .6 percent greater for females (8.2 percent) than for males (7.6 percent). Women comprised 45.6 percent of new enrollees in 1988, up slightly from 44.9 percent in 1983.

Black and white persons, together, made up 95.2 percent of new enrollees in 1988. However, the average annual rates of growth were higher for both Asian persons (15.3 percent) and for American Indians (11.6 percent) than for either white persons (7.5 percent) or black persons (7.7 percent). The highest average annual rate of growth was in the other/unknown race category (18.9 percent), but this rate is usually reduced over time as more complete information is received on the beneficiaries.

In terms of diagnoses, the average annual rate of growth was highest for those persons whose renal failure was attributed to diabetes (13.7 percent) and second highest for those whose renal failure was attributed to hypertension (11.1 percent). These data also show the slowing of growth reflected in the total incidence numbers. The percent change from 1987 to 1988 is lower than the average annual percent change, for each diagnosis category. Diabetics and hypertensives represented the largest proportion of 1988 new enrollees—together representing 57.3 percent of total program additions.

Medicare ESRD program incidence expressed in terms of rates per million population is shown in Table 2. From 1983 to 1988, program incidence increased from 107 enrollees per million persons to 150 enrollees per million persons, representing an average annual rate of

increase of 6.9 percent. Incidence rates are strongly related to age, ranging from 8 enrollees per million persons in the under 15 years of age group to 512 enrollees per million persons in the 65 to 74 years of age group (in 1988). Males had a higher incidence rate (168 enrollees per million) than did females (133 enrollees per million). Black persons had the highest incidence rate (352 enrollees per million), followed by American Indians (284 enrollees per million), Asian persons (165 enrollees per million), and white persons (117 enrollees per million).

Medicare ESRD program incidence per million population is shown by State in Table 3. Overall, as shown in Table 2, incidence rates increased. This is generally the case for individual States as well. Of the 50 States and the District of Columbia, all had higher program incidence rates in 1988 than in 1983. In 1983, 24 States and the District of Columbia had incidence rates greater than 100 enrollees per million persons. In contrast, 44 States and the District of Columbia had incidence rates greater than 100 enrollees per million persons in 1988. The District of Columbia continued to experience an incidence rate greater than 200 enrollees per million persons.

Variations by State in Medicare ESRD program incidence are illustrated again in Table 4, with adjustments for age, sex, and race. State incidence rates per million are averaged across the 6 years from 1983 to 1988 to make the estimates more stable, and the States are ranked from highest to lowest incidence rates.

Information on the unadjusted rates is shown in the first two columns and rates as adjusted for age, sex, and race are shown in the last two columns (adjusted with the indirect method). During this period (1983 to 1988), the U.S. average unadjusted incidence rate was 125 enrollees per million (calculated from Table 3). The individual average unadjusted rates ranged from a high of 280 enrollees per million in the District of Columbia to a low of 47 enrollees per million in Alaska. The age-sex-race adjustment altered the ranking of 13 States (26 percent) by 10 or more positions. It also narrowed the range of incidence rates per million. After adjustment, the individual rates ranged from a high of 157 enrollees per million in New Jersey to a low of 61 enrollees per million in Alaska. The District of Columbia, where black persons comprise 70 percent of the total population, had an adjusted incidence rate of 138 enrollees per million, which is 50.7 percent lower than its unadjusted rate. Conversely, Utah, where the black population is less than 1 percent of the total, had an adjusted rate of 124 enrollees per million, which is 51.2 percent higher than its unadjusted rate of 82 enrollees per million.

Incidence rates per million population for the years from 1983 to 1988, for a number of countries that have ESRD registries, including the U.S., are presented in Table 5. These rates represent not only a difference in underlying renal failure but in the medical and economic

environments in the various countries as well. In 1988, the incidence rates per million persons for countries other than the United States ranged from the low of 15 per million in Poland to the high of 96 per million in Austria.

Most of the countries shown in Table 5 experienced increases in the incidence of treated renal disease between 1983 and 1988. Five of the countries experienced growth rates in excess of 10 percent per year. Due to the high incidence rate among black persons, the total United States incidence rate is not comparable to European countries, which have much smaller black populations. However, in 1988, even the incidence rate among white persons in the United States was much higher than those of European countries. The white incidence rate of 117 per million population in the United States was more than 50 percent greater than the incidence rate of all but four countries (Austria, Belgium, Israel, and Luxembourg).

Tables 6 and 7 show the distribution of patients by treatment category at 30 days after renal failure (Table 6) and at one year following renal failure (Table 7). Patients who select a home dialysis modality are required to fill out the home dialysis election form (HCFA-382). The data from this form was used to determine whether or not the patient was dialyzing at home. If the patient received a transplant within the time frame, either 30 days or one year, and had not experienced a graft failure, then the patient was included in the transplant category. If the patient had not selected a home dialysis modality and did not have a functioning kidney graft and had not died, then the patient was assumed to be on in-facility dialysis.

Between 1985 and 1988, there were 128,044 persons who experienced renal failure and were Medicare entitled. By the end of the first month of renal failure (or Medicare entitlement) 84 percent of patients were receiving in-facility dialysis (see Outpatient). The second most common modality was continuous ambulatory peritoneal dialysis (CAPD) at 10 percent. Only 2 percent of patients had a functioning kidney transplant by the end of 30 days, and 2 percent of patients had died.

Modality selection was significantly related to age at the time of renal failure. Less than 60 percent of pediatric patients (ages less than 15) were on in-facility dialysis after one month. Seventeen percent of pediatric patients had a functioning graft by that time; while 14 percent were on CAPD and 12 percent were on Continuous Cycling Peritoneal Dialysis (CCPD). Use of CAPD as the initial modality declined with age, accounting for less than 10 percent of those persons over age 65. CCPD was not frequently used by any age group other than the pediatric patients. Transplantation as the initial modality also decreased rapidly with age, accounting for less than one percent of all patients over age 55. There were no significant differences in initial modality by sex.

American Indians and whites had lower rates of in-facility dialysis (slightly over 80 percent) than did Asians and blacks (about 90 percent). The differences were accounted for by higher rates of CAPD and home hemodialysis by American Indians and higher rates of CAPD and transplantation among whites.

There were no large differences in initial modality by cause of renal failure. However, patients whose renal

failure was attributed to polycystic kidney disease were most likely to receive a transplant (5 percent).

Patient status at the end of one year following renal failure (or date of Medicare entitlement) is shown in Table 7. Most of the changes in the distribution of patients were due to transplantation. By the end of one year, death had decreased the initial cohort by 23 percent. Fifty-four percent of the initial cohort remained on in-facility dialysis by the end of one year. CAPD remained constant at 10 percent of the initial cohort, while persons with a functioning graft increased to 9 percent.

The effect of mortality was very pronounced by age. Five percent of the pediatric and young adult populations died, while 33 percent of those 66 to 74 died and 43 percent of persons ages 75 and over died. Only about one-fifth (22 percent) of pediatric patients remained on in-facility dialysis by the end of one year. Almost one-half (49 percent) had a functioning graft with most of the remaining patients on CAPD (12 percent) or CCPD (9 percent). For other age groups, the percent of patients on in-facility dialysis ranged from 42 percent, for persons ages 15 to 24, to 61 percent for persons ages 55 to 64. Transplantation decreased rapidly with age. Only 3 percent of persons ages 55 to 64, and less than 1 percent of persons 65 years of age and over, had a functioning graft after one year.

Other demographic differences in mortality, use of CAPD, and transplantation also became more evident by one year following renal failure. A higher percentage of males than females had functioning kidney grafts at one year (11 percent and 8 percent, respectively). Asians (12 percent), whites (11 percent) and American Indians (9 percent) were most likely to have a functioning graft at one year, with Blacks only about one-half as likely (5 percent) to have received a successful kidney transplant. Whites had the highest mortality rate at 26 percent with other racial groups in the 16 to 18 percent range. American Indians (12 percent) and whites (11 percent) were most likely to use CAPD. The rate of home hemodialysis among American Indians (5 percent) was over twice as high as any other racial group.

Mortality and treatment patterns by diagnostic category largely reflected underlying age and racial distributions. Patients whose renal failure was attributed to hypertensive nephropathy had the highest mortality rate (27 percent) and the lowest transplant rate (4 percent), reflecting the higher age distribution and greater concentration of blacks in this diagnostic category. Similarly, patients whose renal failure was attributed to glomerulonephritis were younger than other patients, had a high rate of transplantation (17 percent with a functioning graft), and a low mortality rate (14 percent). The high rate of transplantation (18 percent with a functioning graft) and the low mortality rate (9 percent) among persons whose renal failure was attributed to polycystic kidney disease is probably reflective of their relatively better health status, making them better candidates for transplantation.

Table 1

## Medicare end stage renal disease program incidence, by age, sex, race, and primary diagnosis: 1983-88

| Age, sex, race,<br>and primary diagnosis | 1983   | 1984   | 1985   | 1986   | 1987   | 1988   | Percent<br>1988 | Average<br>annual<br>percent<br>change | Percent<br>change<br>1987-88 |
|--|--------|--------|--------|--------|--------|--------|-----------------|--|------------------------------|
| Number of new enrollees                  |        |        |        |        |        |        |                 |  |                              |
| Total                                    | 25,155 | 26,552 | 29,419 | 31,561 | 34,273 | 36,743 | 100.0           | 7.9                                    | 7.2                          |
| <b>Age</b>                               |        |        |        |        |        |        |                 |  |                              |
| Under 15 years                           | 380    | 427    | 416    | 425    | 427    | 400    | 1.1             | 1.0                                    | -6.3                         |
| 15-24 years                              | 1,103  | 1,159  | 1,186  | 1,181  | 1,231  | 1,254  | 3.4             | 2.6                                    | 1.9                          |
| 25-34 years                              | 2,466  | 2,624  | 2,707  | 2,975  | 2,837  | 3,052  | 8.3             | 4.4                                    | 7.6                          |
| 35-44 years                              | 2,838  | 3,017  | 3,382  | 3,647  | 3,959  | 4,287  | 11.7            | 8.6                                    | 8.3                          |
| 45-54 years                              | 3,755  | 3,877  | 4,222  | 4,422  | 4,834  | 5,318  | 14.5            | 7.2                                    | 10.0                         |
| 55-64 years                              | 5,773  | 6,283  | 6,902  | 7,099  | 7,733  | 8,227  | 22.4            | 7.3                                    | 6.4                          |
| 65-74 years                              | 6,067  | 6,190  | 7,078  | 7,703  | 8,606  | 9,028  | 24.6            | 8.3                                    | 4.9                          |
| 75 years or over                         | 2,773  | 2,975  | 3,526  | 4,109  | 4,646  | 5,177  | 14.1            | 13.3                                   | 11.4                         |
| <b>Sex</b>                               |        |        |        |        |        |        |                 |  |                              |
| Male                                     | 13,863 | 14,719 | 16,047 | 17,356 | 18,634 | 19,998 | 54.4            | 7.6                                    | 7.3                          |
| Female                                   | 11,292 | 11,833 | 13,372 | 14,205 | 15,639 | 16,745 | 45.6            | 8.2                                    | 7.1                          |
| <b>Race</b>                              |        |        |        |        |        |        |                 |  |                              |
| Asian                                    | 316    | 384    | 507    | 508    | 556    | 644    | 1.8             | 15.3                                   | 15.8                         |
| Black                                    | 7,174  | 7,491  | 8,284  | 8,728  | 9,666  | 10,412 | 28.3            | 7.7                                    | 7.7                          |
| White                                    | 17,132 | 18,200 | 20,098 | 21,577 | 23,194 | 24,588 | 66.9            | 7.5                                    | 6.0                          |
| American Indian                          | 260    | 265    | 271    | 335    | 345    | 450    | 1.2             | 11.6                                   | 30.4                         |
| Other/unknown                            | 273    | 212    | 259    | 413    | 512    | 649    | 1.8             | 18.9                                   | 26.8                         |
| <b>Diagnosis</b>                         |        |        |        |        |        |        |                 |  |                              |
| Diabetes                                 | 5,913  | 7,112  | 8,192  | 9,290  | 10,234 | 11,247 | 30.6            | 13.7                                   | 9.9                          |
| Glomerulonephritis                       | 4,101  | 4,362  | 4,575  | 4,687  | 4,902  | 5,087  | 13.8            | 4.4                                    | 3.8                          |
| Hypertension                             | 5,815  | 6,527  | 7,450  | 7,865  | 8,932  | 9,826  | 26.7            | 11.1                                   | 10.0                         |
| Polycystic kidney disease                | 1,053  | 1,063  | 1,153  | 1,208  | 1,229  | 1,209  | 3.3             | 2.8                                    | -1.6                         |
| Interstitial nephropathy                 | 1,209  | 1,272  | 1,346  | 1,343  | 1,221  | 1,179  | 3.2             | -0.5                                   | -3.4                         |
| Obstructive nephropathy                  | 675    | 654    | 823    | 827    | 823    | 851    | 2.3             | 4.7                                    | 3.4                          |
| Other                                    | 1,531  | 1,664  | 1,850  | 1,845  | 1,978  | 2,089  | 5.7             | 6.4                                    | 5.6                          |
| Unknown                                  | 4,858  | 3,898  | 4,030  | 4,496  | 4,954  | 5,255  | 14.3            | 1.6                                    | 6.1                          |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1983-88..

**Table 2**  
**Medicare end stage renal disease program incidence rates per million population,  
 by age, sex, race, and primary diagnosis: 1983-88**

| Age, sex, race,<br>and primary diagnosis | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | Average<br>annual<br>percent<br>change         | Percent<br>change<br>1987-88 |
|--|------|------|------|------|------|------|--|------------------------------|
|  |      |      |      |      |      |      | Number of new enrollees per million population |                              |
| Total                                    | 107  | 112  | 123  | 131  | 141  | 150  | 6.9  | 6.4                          |
| <b>Age</b>                               |      |      |      |      |      |      |  |                              |
| Under 15 years                           | 7    | 8    | 8    | 8    | 8    | 8    | 0.5  | -7.7                         |
| 15-24 years                              | 27   | 29   | 30   | 30   | 32   | 34   | 4.5  | 4.5                          |
| 25-34 years                              | 61   | 64   | 64   | 70   | 65   | 70   | 2.9  | 7.3                          |
| 35-44 years                              | 97   | 99   | 106  | 110  | 115  | 121  | 4.6  | 5.0                          |
| 45-54 years                              | 167  | 172  | 187  | 194  | 208  | 222  | 5.8  | 6.7                          |
| 55-64 years                              | 260  | 282  | 309  | 319  | 351  | 382  | 8.0  | 8.7                          |
| 65-74 years                              | 368  | 370  | 416  | 444  | 487  | 512  | 6.8  | 5.1                          |
| 75 years or over                         | 254  | 265  | 306  | 347  | 382  | 401  | 9.6  | 5.1                          |
| <b>Sex</b>                               |      |      |      |      |      |      |  |                              |
| Male                                     | 122  | 128  | 138  | 148  | 157  | 168  | 6.6  | 6.5                          |
| Female                                   | 94   | 97   | 109  | 115  | 125  | 133  | 7.2  | 6.2                          |
| <b>Race</b>                              |      |      |      |      |      |      |  |                              |
| Asian                                    | 85   | 102  | 133  | 132  | 143  | 165  | 14.2   | 14.9                         |
| Black                                    | 254  | 263  | 288  | 300  | 329  | 352  | 6.7  | 6.9                          |
| White                                    | 85   | 90   | 98   | 104  | 111  | 117  | 6.5  | 5.2                          |
| American Indian                          | 172  | 173  | 176  | 215  | 219  | 284  | 10.6   | 29.4                         |
| Other/unknown                            | —    | —    | —    | —    | —    | —    | —  | —                            |
| <b>Diagnosis</b>                         |      |      |      |      |      |      |  |                              |
| Diabetes                                 | 25   | 30   | 34   | 39   | 42   | 46   | 12.7   | 9.0                          |
| Glomerulonephritis                       | 18   | 18   | 19   | 19   | 20   | 21   | 3.4  | 3.0                          |
| Hypertension                             | 25   | 28   | 31   | 33   | 37   | 40   | 10.0   | 9.2                          |
| Polycystic kidney disease                | 4    | 4    | 5    | 5    | 5    | 5    | 1.9  | -2.4                         |
| Interstitial nephropathy                 | 5    | 5    | 6    | 6    | 5    | 5    | -1.4   | -4.2                         |
| Obstructive nephropathy                  | 3    | 3    | 3    | 3    | 3    | 3    | 3.8  | 2.6                          |
| Other                                    | 7    | 7    | 8    | 8    | 8    | 9    | 5.4  | 4.8                          |
| Unknown                                  | 21   | 16   | 17   | 19   | 20   | 21   | 0.7  | 5.3                          |

NOTE: Average annual percent change calculated by use of compounding.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy; Data from the Program Management and Medical Information System, March 1990 update, 1983-88; and U.S. Department of Commerce, Bureau of the Census: Population Estimates and Projections. *Current Population Reports*. Series P-25, No. 998. Washington. U.S. Government Printing Office.

Table 3

## Medicare end stage renal disease program incidence rates per million population, by State: 1983-88

| State  | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|--|------|------|------|------|------|------|
| Number of new enrollees per million population |      |      |      |      |      |      |
| United States                                  | 106  | 110  | 121  | 129  | 139  | 147  |
| Alabama  | 132  | 127  | 133  | 137  | 155  | 176  |
| Alaska   | 37   | 34   | 25   | 64   | 53   | 67   |
| Arizona  | 122  | 114  | 126  | 142  | 139  | 148  |
| Arkansas                                       | 100  | 110  | 108  | 114  | 144  | 157  |
| California                                     | 114  | 114  | 123  | 137  | 141  | 137  |
| Colorado                                       | 59   | 68   | 75   | 96   | 95   | 97   |
| Connecticut                                    | 119  | 111  | 148  | 137  | 150  | 142  |
| Delaware                                       | 84   | 106  | 141  | 136  | 158  | 185  |
| District of Columbia                           | 272  | 258  | 315  | 267  | 285  | 282  |
| Florida  | 134  | 141  | 149  | 167  | 182  | 184  |
| Georgia  | 132  | 131  | 132  | 151  | 165  | 168  |
| Hawaii   | 106  | 119  | 170  | 157  | 190  | 190  |
| Idaho  | 60   | 66   | 82   | 86   | 80   | 94   |
| Illinois                                       | 108  | 113  | 128  | 138  | 146  | 150  |
| Indiana  | 97   | 97   | 107  | 107  | 128  | 146  |
| Iowa   | 83   | 77   | 95   | 109  | 99   | 110  |
| Kansas   | 74   | 84   | 91   | 100  | 109  | 116  |
| Kentucky                                       | 75   | 88   | 101  | 108  | 117  | 125  |
| Louisiana                                      | 110  | 124  | 134  | 156  | 168  | 189  |
| Maine  | 66   | 93   | 83   | 87   | 96   | 90   |
| Maryland                                       | 105  | 126  | 131  | 126  | 153  | 151  |
| Massachusetts                                  | 96   | 101  | 99   | 104  | 103  | 108  |
| Michigan                                       | 100  | 114  | 117  | 126  | 133  | 150  |
| Minnesota                                      | 76   | 87   | 95   | 99   | 117  | 113  |
| Mississippi                                    | 125  | 121  | 130  | 139  | 147  | 173  |
| Missouri                                       | 92   | 106  | 116  | 129  | 142  | 142  |
| Montana  | 77   | 85   | 81   | 87   | 94   | 86   |
| Nebraska                                       | 70   | 74   | 93   | 92   | 106  | 121  |
| Nevada   | 113  | 98   | 125  | 151  | 134  | 134  |
| New Hampshire                                  | 71   | 75   | 82   | 78   | 101  | 92   |
| New Jersey                                     | 141  | 127  | 152  | 163  | 169  | 176  |
| New Mexico                                     | 99   | 97   | 107  | 108  | 110  | 155  |
| New York                                       | 110  | 115  | 120  | 131  | 133  | 148  |
| North Carolina                                 | 111  | 115  | 141  | 138  | 156  | 159  |
| North Dakota                                   | 59   | 76   | 76   | 102  | 92   | 108  |
| Ohio   | 98   | 105  | 116  | 124  | 134  | 152  |
| Oklahoma                                       | 76   | 89   | 93   | 106  | 113  | 142  |
| Oregon   | 85   | 80   | 97   | 108  | 113  | 122  |
| Pennsylvania                                   | 109  | 125  | 138  | 144  | 146  | 157  |
| Rhode Island                                   | 110  | 119  | 129  | 102  | 116  | 131  |
| South Carolina                                 | 126  | 136  | 165  | 166  | 173  | 188  |
| South Dakota                                   | 79   | 92   | 96   | 89   | 131  | 122  |
| Tennessee                                      | 109  | 96   | 113  | 117  | 140  | 136  |
| Texas  | 107  | 106  | 118  | 125  | 139  | 157  |
| Utah   | 65   | 93   | 69   | 80   | 83   | 101  |
| Vermont  | 69   | 72   | 77   | 65   | 91   | 95   |
| Virginia                                       | 131  | 136  | 160  | 126  | 144  | 150  |
| Washington                                     | 76   | 81   | 89   | 95   | 96   | 101  |
| West Virginia                                  | 95   | 111  | 104  | 117  | 129  | 155  |
| Wisconsin                                      | 76   | 89   | 89   | 101  | 120  | 132  |
| Wyoming  | 43   | 57   | 69   | 49   | 71   | 109  |

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1983-88; and U.S. Department of Commerce, Bureau of the Census: Population Estimates and Projections. *Current Population Reports*. Series P-25, No. 998. Washington. U.S. Government Printing Office.

**Table 4**  
**Average Medicare end stage renal disease program incidence rates**  
**per million population, by State: 1983-88**

| State  | Unadjusted |      | Age, sex, race, adjusted |      |
|--|------------|------|--------------------------|------|
|  | Rate       | Rank | Rate                     | Rank |
| Number of new enrollees per million population |            |      |                          |      |
| Alabama  | 143        | 8    | 125                      | 21   |
| Alaska   | 47         | 51   | 61                       | 51   |
| Arizona  | 132        | 16   | 139                      | 5    |
| Arkansas                                       | 122        | 23   | 113                      | 36   |
| California                                     | 128        | 18   | 122                      | 25   |
| Colorado                                       | 82         | 46   | 101                      | 48   |
| Connecticut                                    | 135        | 14   | 145                      | 2    |
| Delaware                                       | 136        | 13   | 138                      | 7    |
| District of Columbia                           | 280        | 1    | 138                      | 8    |
| Florida  | 160        | 2    | 138                      | 6    |
| Georgia  | 147        | 6    | 136                      | 12   |
| Hawaii   | 156        | 4    | 87                       | 50   |
| Idaho  | 78         | 49   | 103                      | 46   |
| Illinois                                       | 130        | 17   | 129                      | 18   |
| Indiana  | 114        | 29   | 131                      | 14   |
| Iowa   | 95         | 39   | 114                      | 35   |
| Kansas   | 96         | 38   | 106                      | 40   |
| Kentucky                                       | 102        | 32   | 118                      | 29   |
| Louisiana                                      | 147        | 7    | 131                      | 16   |
| Maine  | 86         | 42   | 106                      | 42   |
| Maryland                                       | 132        | 15   | 123                      | 24   |
| Massachusetts                                  | 102        | 33   | 115                      | 34   |
| Michigan                                       | 123        | 22   | 132                      | 13   |
| Minnesota                                      | 98         | 37   | 122                      | 26   |
| Mississippi                                    | 140        | 10   | 112                      | 37   |
| Missouri                                       | 121        | 25   | 124                      | 23   |
| Montana  | 85         | 44   | 104                      | 45   |
| Nebraska                                       | 93         | 40   | 108                      | 38   |
| Nevada   | 126        | 19   | 144                      | 3    |
| New Hampshire                                  | 84         | 45   | 107                      | 39   |
| New Jersey                                     | 155        | 5    | 157                      | 1    |
| New Mexico                                     | 113        | 30   | 116                      | 31   |
| New York                                       | 126        | 20   | 115                      | 33   |
| North Carolina                                 | 137        | 11   | 126                      | 20   |
| North Dakota                                   | 85         | 43   | 105                      | 44   |
| Ohio   | 122        | 24   | 131                      | 15   |
| Oklahoma                                       | 103        | 31   | 105                      | 43   |
| Oregon   | 101        | 36   | 120                      | 28   |
| Pennsylvania                                   | 137        | 12   | 137                      | 9    |
| Rhode Island                                   | 118        | 28   | 130                      | 17   |
| South Carolina                                 | 159        | 3    | 141                      | 4    |
| South Dakota                                   | 102        | 34   | 116                      | 32   |
| Tennessee                                      | 119        | 26   | 118                      | 30   |
| Texas  | 126        | 21   | 128                      | 19   |
| Utah   | 82         | 47   | 124                      | 22   |
| Vermont  | 78         | 48   | 102                      | 47   |
| Virginia                                       | 141        | 9    | 136                      | 10   |
| Washington                                     | 90         | 41   | 106                      | 41   |
| West Virginia                                  | 118        | 27   | 136                      | 11   |
| Wisconsin                                      | 101        | 35   | 121                      | 27   |
| Wyoming  | 66         | 50   | 92                       | 49   |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy; Data from the Program Management and Medical Information System, March 1990 update, 1983-88.

**Table 5**  
**New end stage renal disease patients per million population, for selected countries: 1983-88**

| Country                        | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | Average annual percent increase | Percent change 1987-88 |
|--------------------------------|------|------|------|------|------|------|---------------------------------|------------------------|
| Number of patients per million |      |      |      |      |      |      |                                 |                        |
| Austria                        | 54   | 62   | 57   | 70   | 77   | 96   | 12.1                            | 24.3                   |
| Belgium                        | 61   | 70   | 62   | 74   | 76   | 85   | 6.9                             | 12.1                   |
| Bulgaria                       | 28   | 20   | 33   | 33   | 38   | 30   | 1.5                             | -20.8                  |
| Czechoslovakia                 | 21   | 21   | 23   | 27   | 29   | 33   | 9.2                             | 12.4                   |
| Denmark                        | 40   | 40   | 43   | 56   | 48   | 53   | 5.6                             | 9.4                    |
| Federal Republic of Germany    | 56   | 67   | 59   | 66   | 85   | 77   | 6.6                             | -9.4                   |
| Finland                        | 46   | 35   | 45   | 41   | 47   | 49   | 1.3                             | 4.5                    |
| France                         | 44   | 49   | 43   | 44   | 58   | 56   | 5.1                             | -2.9                   |
| German Democratic Republic     | 28   | 33   | 32   | 35   | 38   | 43   | 8.8                             | 12.1                   |
| Greece                         | 41   | 47   | 58   | 54   | 58   | 59   | 7.6                             | 2.1                    |
| Hungary                        | 12   | 14   | 19   | 16   | 21   | 24   | 15.2                            | 15.7                   |
| Iceland                        | 5    | 50   | 0    | 37   | 57   | 29   | 41.7                            | -49.8                  |
| Ireland                        | 24   | 28   | 48   | 33   | 36   | 34   | 7.1                             | -6.1                   |
| Israel                         | 67   | 75   | 59   | 58   | 70   | 80   | 3.6                             | 14.3                   |
| Italy                          | 46   | 48   | 47   | 49   | 49   | 55   | 3.5                             | 11.6                   |
| Luxembourg                     | 73   | 38   | 52   | 85   | 66   | 87   | 3.7                             | 32.4                   |
| Netherlands                    | 46   | 34   | 49   | 48   | 44   | 65   | 7.3                             | 48.4                   |
| Norway                         | 54   | 53   | 36   | 59   | 43   | 53   | -0.5                            | 22.6                   |
| Poland                         | 8    | 11   | 10   | 13   | 16   | 15   | 14.0                            | -3.7                   |
| Portugal                       | 41   | 43   | 49   | 50   | 49   | 43   | 0.7                             | -13.3                  |
| Spain                          | 61   | 59   | 45   | 51   | 50   | 57   | -1.3                            | 14.2                   |
| Sweden                         | 61   | 60   | 62   | 60   | 56   | 64   | 1.1                             | 14.8                   |
| Switzerland                    | 55   | 47   | 59   | 65   | 62   | 62   | 2.4                             | -0.3                   |
| United Kingdom                 | 33   | 34   | 43   | 47   | 51   | 55   | 10.8                            | 8.0                    |
| Yugoslavia                     | 32   | 36   | 32   | 36   | 39   | 43   | 6.2                             | 10.8                   |
| Australia                      | 38   | 45   | 39   | 44   | 48   | 46   | 3.9                             | -4.2                   |
| New Zealand                    | 30   | 34   | 37   | 43   | 44   | 43   | 7.5                             | -2.3                   |
| Canada                         | 53   | 58   | 61   | 67   | 71   | 74   | 7.1                             | 4.3                    |
| United States <sup>1</sup>     | 107  | 112  | 123  | 131  | 141  | 150  | 6.9                             | 6.4                    |
| White                          | 85   | 90   | 98   | 104  | 111  | 117  | 6.5                             | 5.2                    |
| Black                          | 254  | 263  | 288  | 300  | 329  | 352  | 6.7                             | 6.9                    |
| Asian                          | 85   | 102  | 133  | 132  | 143  | 165  | 14.2                            | 14.9                   |
| Indian                         | 172  | 173  | 176  | 215  | 219  | 284  | 10.6                            | 29.4                   |

<sup>1</sup>Includes only Medicare entitled end stage renal disease (ESRD) patients. Of all ESRD patients in the United States, it is estimated that 7 to 10 percent are not Medicare eligible.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1983-88; European Dialysis and Transplant Association (EDTA) Combined Report on Regular Dialysis and Transplantation in Europe, 1983-88; Canadian Renal Failure Register, 1988; Report on the Australia and New Zealand Dialysis and Transplant Registry, 1988.

**Table 6**  
**Medicare end stage renal disease program Incidence modality, by age, sex, race,  
and primary diagnosis: 1985-88, Patients' status at 30 days**

| Age, sex, race,<br>and primary diagnosis | Total<br>patients | Percent<br>total | Home       |              |                   |                   |       |    | Transplant | Death |
|--|-------------------|------------------|------------|--------------|-------------------|-------------------|-------|----|------------|-------|
|  |                   |                  | Outpatient | Hemodialysis | CAPD <sup>1</sup> | CCPD <sup>2</sup> | Other |    |            |       |
| Percent of Patients                      |                   |                  |            |              |                   |                   |       |    |            |       |
| Total                                    | 128,044           | 100              | 84         | 1            | 10                | 1                 | 0     | 2  | 2          |       |
| <b>Age</b>                               |                   |                  |            |              |                   |                   |       |    |            |       |
| Under 15 years                           | 1,603             | 100              | 56         | 0            | 14                | 12                | 2     | 17 | 0          |       |
| 15-24 years                              | 4,596             | 100              | 74         | 1            | 11                | 2                 | 1     | 11 | 0          |       |
| 25-34 years                              | 11,020            | 100              | 77         | 1            | 13                | 1                 | 0     | 7  | 0          |       |
| 35-44 years                              | 14,497            | 100              | 78         | 1            | 13                | 2                 | 0     | 5  | 1          |       |
| 45-54 years                              | 17,873            | 100              | 83         | 1            | 11                | 1                 | 0     | 3  | 1          |       |
| 55-64 years                              | 28,622            | 100              | 86         | 1            | 10                | 1                 | 0     | 1  | 2          |       |
| 65-74 years                              | 32,383            | 100              | 87         | 1            | 8                 | 1                 | 0     | 0  | 3          |       |
| 75 years or over                         | 17,450            | 100              | 88         | 1            | 6                 | 1                 | 0     | 0  | 4          |       |
| <b>Sex</b>                               |                   |                  |            |              |                   |                   |       |    |            |       |
| Male                                     | 69,834            | 100              | 83         | 1            | 10                | 1                 | 0     | 3  | 2          |       |
| Female                                   | 58,210            | 100              | 84         | 1            | 10                | 1                 | 0     | 2  | 2          |       |
| <b>Race</b>                              |                   |                  |            |              |                   |                   |       |    |            |       |
| Asian                                    | 2,107             | 100              | 90         | 0            | 5                 | 1                 | 0     | 2  | 1          |       |
| Black                                    | 35,702            | 100              | 90         | 0            | 6                 | 1                 | 0     | 1  | 1          |       |
| White                                    | 87,192            | 100              | 81         | 1            | 11                | 1                 | 0     | 3  | 2          |       |
| American Indian                          | 1,340             | 100              | 82         | 3            | 12                | 1                 | 0     | 1  | 1          |       |
| Other/unknown                            | 1,703             | 100              | 89         | 0            | 6                 | 1                 | 0     | 1  | 2          |       |
| <b>Diagnosis</b>                         |                   |                  |            |              |                   |                   |       |    |            |       |
| Diabetes                                 | 37,810            | 100              | 83         | 1            | 11                | 1                 | 0     | 2  | 2          |       |
| Glomerulonephritis                       | 18,624            | 100              | 80         | 1            | 12                | 2                 | 0     | 3  | 1          |       |
| Hypertension                             | 33,301            | 100              | 88         | 1            | 8                 | 1                 | 0     | 0  | 2          |       |
| Polycystic kidney disease                | 4,651             | 100              | 80         | 2            | 12                | 1                 | 0     | 5  | 1          |       |
| Interstitial nephropathy                 | 4,981             | 100              | 84         | 1            | 10                | 1                 | 0     | 2  | 1          |       |
| Obstructive nephropathy                  | 3,274             | 100              | 88         | 1            | 6                 | 1                 | 0     | 2  | 2          |       |
| Other                                    | 7,517             | 100              | 81         | 1            | 10                | 2                 | 1     | 3  | 2          |       |
| Unknown                                  | 17,886            | 100              | 82         | 1            | 8                 | 1                 | 0     | 5  | 3          |       |

<sup>1</sup>Continuous ambulatory peritoneal dialysis

<sup>2</sup>Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update.

**Table 7**  
**Medicare end stage renal disease program Incidence modality, by age, sex, race, and primary diagnosis: 1985-88, Patients' status at one year**

| Age, sex, race, and primary diagnosis | Total patients | Percent total | Home       |              |                   |                   |       |    | Transplant | Death |
|---------------------------------------|----------------|---------------|------------|--------------|-------------------|-------------------|-------|----|------------|-------|
|                                       |                |               | Outpatient | Hemodialysis | CAPD <sup>1</sup> | CCPD <sup>2</sup> | Other |    |            |       |
| Percent of Patients                   |                |               |            |              |                   |                   |       |    |            |       |
| Total                                 | 128,044        | 100           | 54         | 2            | 10                | 1                 | 0     | 9  | 23         |       |
| <b>Age</b>                            |                |               |            |              |                   |                   |       |    |            |       |
| Under 15 years                        | 1,603          | 100           | 22         | 0            | 12                | 9                 | 2     | 49 | 5          |       |
| 15-24 years                           | 4,596          | 100           | 42         | 1            | 11                | 2                 | 0     | 38 | 5          |       |
| 25-34 years                           | 11,020         | 100           | 45         | 2            | 13                | 1                 | 0     | 29 | 9          |       |
| 35-44 years                           | 14,497         | 100           | 50         | 2            | 14                | 2                 | 0     | 21 | 10         |       |
| 45-54 years                           | 17,873         | 100           | 58         | 2            | 13                | 1                 | 0     | 11 | 14         |       |
| 55-64 years                           | 28,622         | 100           | 61         | 2            | 11                | 1                 | 0     | 3  | 22         |       |
| 65-74 years                           | 32,383         | 100           | 56         | 2            | 8                 | 1                 | 0     | 0  | 33         |       |
| 75 years or over                      | 17,450         | 100           | 49         | 2            | 5                 | 0                 | 0     | 0  | 43         |       |
| <b>Sex</b>                            |                |               |            |              |                   |                   |       |    |            |       |
| Male                                  | 69,834         | 100           | 52         | 2            | 10                | 1                 | 0     | 11 | 24         |       |
| Female                                | 58,210         | 100           | 56         | 2            | 11                | 1                 | 0     | 8  | 23         |       |
| <b>Race</b>                           |                |               |            |              |                   |                   |       |    |            |       |
| Asian                                 | 2,107          | 100           | 63         | 2            | 7                 | 1                 | 0     | 12 | 16         |       |
| Black                                 | 35,702         | 100           | 68         | 1            | 8                 | 1                 | 0     | 5  | 18         |       |
| White                                 | 87,192         | 100           | 48         | 2            | 11                | 1                 | 0     | 11 | 26         |       |
| American Indian                       | 1,340          | 100           | 55         | 5            | 12                | 1                 | 0     | 9  | 18         |       |
| Other/unknown                         | 1,703          | 100           | 66         | 1            | 7                 | 2                 | 0     | 4  | 19         |       |
| <b>Diagnosis</b>                      |                |               |            |              |                   |                   |       |    |            |       |
| Diabetes                              | 37,810         | 100           | 53         | 1            | 11                | 1                 | 0     | 8  | 26         |       |
| Glomerulonephritis                    | 18,624         | 100           | 51         | 2            | 14                | 2                 | 0     | 17 | 14         |       |
| Hypertension                          | 33,301         | 100           | 59         | 1            | 8                 | 1                 | 0     | 4  | 27         |       |
| Polycystic kidney disease             | 4,651          | 100           | 53         | 4            | 14                | 2                 | 0     | 18 | 9          |       |
| Interstitial nephropathy              | 4,981          | 100           | 56         | 2            | 11                | 1                 | 0     | 10 | 19         |       |
| Obstructive nephropathy               | 3,274          | 100           | 56         | 2            | 6                 | 1                 | 0     | 7  | 27         |       |
| Other                                 | 7,517          | 100           | 46         | 2            | 11                | 2                 | 1     | 12 | 27         |       |
| Unknown                               | 17,886         | 100           | 52         | 1            | 9                 | 1                 | 0     | 12 | 24         |       |

<sup>1</sup>Continuous ambulatory peritoneal dialysis

<sup>2</sup>Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update.

## Program enrollment

Trends in Medicare ESRD program total enrollment for the years 1983 to 1988 are described in this section. Tables are presented that show Medicare ESRD enrollment by age, sex, race, and primary diagnosis. Enrollment is broken into two groups of persons: those on dialysis and those with a functioning graft. Enrollment counts are taken as of December 31 each year and reflect the patients' dialysis or transplant status as of that date.<sup>1</sup> Medicare enrollment by dialysis and functioning graft patient groups for the years 1978 to 1988 is presented in Table 8. During this time, enrollment grew from 44,153 to 134,786—an average annual rate of increase of 11.8 percent. The number of patients on dialysis grew at a slower rate of 10.4 percent per year (from 39,195 in 1978 to 105,096 in 1988). From 1987 to 1988, the rate of growth was only 7.1 percent for the patients on dialysis. The number of patients with a functioning kidney graft increased at an annual rate of 19.6 percent (from 4,958 in 1978 to 29,690 in 1988). The rapid growth in patients with a functioning graft was due, in part, to increases in the number of transplants performed and, in part, to increased graft survival rates. As a result of these transplantation trends, patients with a functioning graft increased from 11.2 percent of the total Medicare ESRD population in 1978 to 22.0 percent in 1988. However, the increase in the functioning graft population from 1987 to 1988 was only 10.5 percent, reflecting the lack of increase in transplants in the most recent years.

Medicare dialysis patient population by age, sex, race, and primary diagnosis for the years 1983 to 1988 is shown in Table 9. The growth rate in the dialysis patient population has been greatest for persons 75 years of age or over, primarily as a result of the increase in program incidence rates shown in Tables 1 and 2. In 1983, persons 75 years of age or over accounted for 8.3 percent of the total dialysis patient population, increasing to 12.3 percent in 1988. The largest populations in absolute numbers were those in the two age groups between 55 and 74 years of age. Together these two groups accounted for 47.9 percent of the total dialysis patient population. In 1988, 52.2 percent of the Medicare dialysis population were male and 60.8 percent were white persons. The major diagnoses reported as primary causes of renal failure were hypertension (24.8 percent), diabetes (22.0 percent), and

glomerulonephritis (16.6 percent). Medicare dialysis patient population expressed as enrollment per million population is shown in Table 10. Overall, dialysis patient enrollment increased from 314 per million population in 1983 to 428 per million in 1988—an average annual increase of 6.4 percent. Dialysis enrollment rates varied markedly with age, ranging from 13 per million for persons under 15 years of age to 1,483 per million for persons 65 to 74 years of age. Males had an enrollment rate per million that was 15.3 percent greater than females (460 per million and 399 per million, respectively). Dialysis patient enrollment for black persons was four times as great as for white persons (1,223 per million and 304 per million, respectively). Enrollment rates among Asians and American Indians may be underestimated because of underreporting in earlier years.

The Medicare ESRD population with a functioning graft is presented in Table 11 by age, sex, race, and primary diagnosis for the years 1983 to 1988. The same population in terms of rates per million population is shown in Table 12. In contrast to the dialysis population, those patients with functioning grafts came largely from the younger age groups. Of patients with functioning grafts in 1983 and 1988, 90.2 percent and 83.3 percent, respectively, were under 55 years of age. The percent increase from 1983 to 1988 was greater for each of the three older age groups than for any of the other age groups. Taken together, the 55 years of age or older group increased at an annual rate of 32.7 percent from 1983 to 1988; the under 55 years of age group increased by only 18.6 percent per year over the same period. In 1988, 62.1 percent of the Medicare ESRD population with a functioning kidney graft were male and 77.9 percent were white persons. The major diagnoses reported as the primary cause for renal failure were glomerulonephritis (27.3 percent) and diabetes (17.7 percent).

In terms of rates per million population (Table 12), the ESRD functioning graft population increased from 55 per million in 1983 to 121 per million in 1988—a 16.9 percent annual rate of increase. In 1988, those persons 35 to 44 years of age and 45 to 54 years of age had the highest rates per million population (237 per million and 267 per million, respectively). The rate was higher for males (155 per million) than for females (89 per million). The rate per million population was highest for black persons (183 per million) followed by American Indians (174 per million), Asian persons (143 per million), and white persons (110 per million).

<sup>1</sup> Before 1984, there were problems of underreporting of kidney transplants and some people who have a functioning graft will be misclassified as on dialysis. Therefore, the data will tend to overestimate the number of persons on dialysis and underestimate the number of people with functioning grafts.

**Table 8**  
**Medicare end stage renal disease enrollment, by dialysis and functioning graft: 1978-88**

| Year                            | Patients on dialysis |         | Patients with a functioning graft |         | All patients |         |
|---------------------------------|----------------------|---------|-----------------------------------|---------|--------------|---------|
|                                 | Number               | Percent | Number                            | Percent | Number       | Percent |
| 1978                            | 39,195               | 88.8    | 4,958                             | 11.2    | 44,153       | 100.0   |
| 1979                            | 45,968               | 88.1    | 6,216                             | 11.9    | 52,184       | 100.0   |
| 1980                            | 52,587               | 87.6    | 7,466                             | 12.4    | 60,053       | 100.0   |
| 1981                            | 58,746               | 87.0    | 8,747                             | 13.0    | 67,493       | 100.0   |
| 1982                            | 65,674               | 86.1    | 10,642                            | 13.9    | 76,316       | 100.0   |
| 1983                            | 73,578               | 85.2    | 12,776                            | 14.8    | 86,354       | 100.0   |
| 1984                            | 79,863               | 83.6    | 15,659                            | 16.4    | 95,522       | 100.0   |
| 1985                            | 85,904               | 81.9    | 18,975                            | 18.1    | 104,879      | 100.0   |
| 1986                            | 91,478               | 79.8    | 23,181                            | 20.2    | 114,659      | 100.0   |
| 1987                            | 98,143               | 78.5    | 26,868                            | 21.5    | 125,011      | 100.0   |
| 1988                            | 105,096              | 78.0    | 29,690                            | 22.0    | 134,786      | 100.0   |
| Average annual percent increase | —                    | 10.4    | —                                 | 19.6    | —            | 11.8    |
| 1987-88 percent increase        | —                    | 7.1     | —                                 | 10.5    | —            | 7.8     |

NOTES: Enrollment is as of December 31 of each year and includes Medicare patients who are alive and currently entitled. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1978-88.

**Table 9**  
**Medicare end stage renal disease program enrollment for dialysis patients, by age, sex, race, and primary diagnosis: 1983-88**

| Age, sex, race, and primary diagnosis | 1983   | 1984   | 1985   | 1986   | 1987   | 1988    | Percent 1988 | Average annual percent increase | Percent change 1987-88 |
|---------------------------------------|--------|--------|--------|--------|--------|---------|--------------|---------------------------------|------------------------|
|                                       |        |        |        |        |        |         |              | Number of patients              |                        |
| Total                                 | 73,578 | 79,863 | 85,904 | 91,478 | 98,143 | 105,096 | 100.0        | 7.4                             | 7.1                    |
| <b>Age</b>                            |        |        |        |        |        |         |              |                                 |                        |
| Under 15 years                        | 669    | 669    | 649    | 665    | 673    | 672     | 0.6          | 0.1                             | -0.1                   |
| 15-24 years                           | 2,708  | 2,761  | 2,763  | 2,689  | 2,749  | 2,853   | 2.7          | 1.0                             | 3.8                    |
| 25-34 years                           | 7,194  | 7,464  | 7,738  | 7,955  | 8,175  | 8,645   | 8.2          | 3.7                             | 5.7                    |
| 35-44 years                           | 9,553  | 10,257 | 10,971 | 11,663 | 12,424 | 13,386  | 12.7         | 7.0                             | 7.7                    |
| 45-54 years                           | 12,593 | 13,389 | 13,960 | 14,440 | 15,138 | 16,309  | 15.5         | 5.3                             | 7.7                    |
| 55-64 years                           | 18,378 | 19,762 | 21,044 | 21,830 | 23,067 | 24,223  | 23.0         | 5.7                             | 5.0                    |
| 65-74 years                           | 16,392 | 18,306 | 20,223 | 22,337 | 24,426 | 26,133  | 24.9         | 9.8                             | 7.0                    |
| 75 years or over                      | 6,091  | 7,255  | 8,556  | 9,899  | 11,491 | 12,875  | 12.3         | 16.1                            | 12.0                   |
| <b>Sex</b>                            |        |        |        |        |        |         |              |                                 |                        |
| Male                                  | 39,628 | 42,881 | 45,724 | 48,244 | 51,402 | 54,886  | 52.2         | 6.7                             | 6.8                    |
| Female                                | 33,950 | 36,982 | 40,180 | 43,234 | 46,741 | 50,210  | 47.8         | 8.1                             | 7.4                    |
| <b>Race</b>                           |        |        |        |        |        |         |              |                                 |                        |
| Asian                                 | 618    | 792    | 1,006  | 1,188  | 1,347  | 1,574   | 1.5          | 20.6                            | 16.9                   |
| Black                                 | 23,123 | 25,720 | 28,245 | 30,588 | 33,401 | 36,153  | 34.4         | 9.4                             | 8.2                    |
| White                                 | 47,042 | 50,580 | 53,901 | 56,821 | 60,324 | 63,872  | 60.8         | 6.3                             | 5.9                    |
| American Indian                       | 464    | 620    | 710    | 821    | 925    | 1,083   | 1.0          | 18.5                            | 17.1                   |
| Other/unknown                         | 2,331  | 2,151  | 2,042  | 2,060  | 2,146  | 2,414   | 2.3          | 0.7                             | 12.5                   |
| <b>Diagnosis</b>                      |        |        |        |        |        |         |              |                                 |                        |
| Diabetes                              | 10,209 | 12,815 | 15,248 | 17,712 | 20,345 | 23,111  | 22.0         | 17.8                            | 13.6                   |
| Glomerulonephritis                    | 12,338 | 13,651 | 14,910 | 15,798 | 16,701 | 17,478  | 16.6         | 7.2                             | 4.7                    |
| Hypertension                          | 14,321 | 16,694 | 19,112 | 21,389 | 23,861 | 26,097  | 24.8         | 12.8                            | 9.4                    |
| Polycystic kidney disease             | 3,899  | 4,217  | 4,492  | 4,679  | 4,837  | 4,908   | 4.7          | 4.7                             | 1.5                    |
| Interstitial nephropathy              | 2,644  | 3,193  | 3,665  | 3,977  | 4,066  | 4,180   | 4.0          | 9.6                             | 2.8                    |
| Obstructive nephropathy               | 2,841  | 2,875  | 3,008  | 2,999  | 3,005  | 3,059   | 2.9          | 1.5                             | 1.8                    |
| Other                                 | 2,572  | 3,182  | 3,767  | 4,260  | 4,773  | 5,181   | 4.9          | 15.0                            | 8.5                    |
| Unknown                               | 24,754 | 23,236 | 21,702 | 20,664 | 20,555 | 21,082  | 20.1         | -3.2                            | 2.6                    |

NOTES: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1983-88.

**Table 10**  
**Medicare end stage renal disease program dialysis enrollment per million population,  
by age, sex, race, and primary diagnosis: 1983-88**

| Age, sex, race,<br>and primary diagnosis | 1983 | 1984  | 1985  | 1986  | 1987  | 1988  | Average<br>annual<br>percent<br>change | Percent<br>change<br>1987-88 |
|--|------|-------|-------|-------|-------|-------|--|------------------------------|
|  |      |       |       |       |       |       | Number of enrollees per million        |                              |
| Total                                    | 314  | 338   | 360   | 379   | 403   | 428   | 6.4                                    | 6.3                          |
| <b>Age</b>                               |      |       |       |       |       |       |  |                              |
| Under 15 years                           | 13   | 13    | 12    | 13    | 13    | 13    | -0.5                                   | -1.6                         |
| 15-24 years                              | 66   | 69    | 70    | 69    | 72    | 77    | 2.9                                    | 6.5                          |
| 25-34 years                              | 178  | 181   | 184   | 186   | 189   | 199   | 2.3                                    | 5.5                          |
| 35-44 years                              | 326  | 336   | 345   | 353   | 362   | 378   | 3.0                                    | 4.5                          |
| 45-54 years                              | 561  | 595   | 618   | 633   | 650   | 679   | 3.9                                    | 4.5                          |
| 55-64 years                              | 827  | 886   | 942   | 982   | 1,048 | 1,124 | 6.3                                    | 7.3                          |
| 65-74 years                              | 994  | 1,094 | 1,189 | 1,289 | 1,382 | 1,483 | 8.3                                    | 7.2                          |
| 75 years or over                         | 557  | 646   | 742   | 836   | 944   | 998   | 12.4                                   | 5.7                          |
| <b>Sex</b>                               |      |       |       |       |       |       |  |                              |
| Male                                     | 348  | 373   | 394   | 411   | 434   | 460   | 5.7                                    | 6.0                          |
| Female                                   | 282  | 304   | 328   | 349   | 374   | 399   | 7.2                                    | 6.5                          |
| <b>Race</b>                              |      |       |       |       |       |       |  |                              |
| Asian                                    | 166  | 210   | 265   | 309   | 348   | 403   | 19.5                                   | 15.9                         |
| Black                                    | 819  | 902   | 981   | 1,052 | 1,138 | 1,223 | 8.3                                    | 7.4                          |
| White                                    | 234  | 250   | 263   | 275   | 289   | 304   | 5.3                                    | 5.1                          |
| American Indian                          | 307  | 406   | 460   | 527   | 588   | 683   | 17.4                                   | 16.2                         |
| Other/unknown                            | —    | —     | —     | —     | —     | —     | —                                      | —                            |
| <b>Diagnosis</b>                         |      |       |       |       |       |       |  |                              |
| Diabetes                                 | 44   | 54    | 64    | 73    | 84    | 94    | 16.7                                   | 12.7                         |
| Glomerulonephritis                       | 53   | 58    | 62    | 66    | 69    | 71    | 6.2                                    | 3.8                          |
| Hypertension                             | 61   | 71    | 80    | 89    | 98    | 106   | 11.7                                   | 8.5                          |
| Polycystic kidney disease                | 17   | 18    | 19    | 19    | 20    | 20    | 3.8                                    | 0.7                          |
| Interstitial nephropathy                 | 11   | 14    | 15    | 16    | 17    | 17    | 8.6                                    | 2.0                          |
| Obstructive nephropathy                  | 12   | 12    | 13    | 12    | 12    | 12    | 0.6                                    | 1.0                          |
| Other                                    | 11   | 13    | 16    | 18    | 20    | 21    | 14.0                                   | 7.7                          |
| Unknown                                  | 106  | 98    | 91    | 86    | 84    | 86    | -4.0                                   | 1.8                          |

NOTES: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1983-88.

Table 11

**Medicare end stage renal disease program enrollment for patients with functioning grafts,  
by age, sex, race, and primary diagnosis: 1983-88**

| Age, sex, race,<br>and primary diagnosis | 1983   | 1984   | 1985   | 1986   | 1987   | 1988   | Percent<br>1988 | Average<br>annual<br>percent<br>change | Percent<br>increase<br>1987-88 |
|--|--------|--------|--------|--------|--------|--------|-----------------|--|--------------------------------|
| Number of patients                       |        |        |        |        |        |        |                 |  |                                |
| Total                                    | 12,776 | 15,659 | 18,975 | 23,181 | 26,868 | 29,690 | 100.0           | 18.4                                   | 10.5                           |
| <b>Age</b>                               |        |        |        |        |        |        |                 |  |                                |
| Under 15 years                           | 418    | 524    | 635    | 725    | 806    | 850    | 2.9             | 15.3                                   | 5.5                            |
| 15-24 years                              | 1,629  | 1,792  | 2,018  | 2,279  | 2,399  | 2,369  | 8.0             | 7.8                                    | -1.3                           |
| 25-34 years                              | 3,752  | 4,491  | 5,133  | 6,026  | 6,525  | 6,706  | 22.6            | 12.3                                   | 2.8                            |
| 35-44 years                              | 3,348  | 4,206  | 5,278  | 6,500  | 7,548  | 8,397  | 28.3            | 20.2                                   | 11.2                           |
| 45-54 years                              | 2,374  | 2,946  | 3,649  | 4,559  | 5,557  | 6,398  | 21.5            | 21.9                                   | 15.1                           |
| 55-64 years                              | 1,105  | 1,491  | 1,944  | 2,615  | 3,301  | 3,959  | 13.3            | 29.1                                   | 19.9                           |
| 65-74 years                              | 147    | 202    | 306    | 458    | 701    | 970    | 3.3             | 45.8                                   | 38.4                           |
| 75 years or over                         | 3      | 7      | 12     | 19     | 31     | 41     | 0.1             | 68.7                                   | 32.3                           |
| <b>Sex</b>                               |        |        |        |        |        |        |                 |  |                                |
| Male                                     | 8,046  | 9,861  | 11,982 | 14,645 | 16,858 | 18,448 | 62.1            | 18.1                                   | 9.4                            |
| Female                                   | 4,730  | 5,798  | 6,993  | 8,536  | 10,010 | 11,242 | 37.9            | 18.9                                   | 12.3                           |
| <b>Race</b>                              |        |        |        |        |        |        |                 |  |                                |
| Asian                                    | 131    | 196    | 254    | 366    | 471    | 559    | 1.9             | 33.7                                   | 18.7                           |
| Black                                    | 2,221  | 2,790  | 3,482  | 4,227  | 4,837  | 5,420  | 18.3            | 19.5                                   | 12.1                           |
| White                                    | 9,995  | 12,292 | 14,827 | 18,136 | 21,051 | 23,133 | 77.9            | 18.3                                   | 9.9                            |
| American Indian                          | 134    | 135    | 172    | 201    | 243    | 276    | 0.9             | 15.5                                   | 13.6                           |
| Other/unknown                            | 295    | 246    | 240    | 251    | 266    | 302    | 1.0             | 0.5                                    | 13.5                           |
| <b>Diagnosis</b>                         |        |        |        |        |        |        |                 |  |                                |
| Diabetes                                 | 1,566  | 2,116  | 2,884  | 3,830  | 4,619  | 5,254  | 17.7            | 27.4                                   | 13.7                           |
| Glomerulonephritis                       | 3,381  | 4,323  | 5,234  | 6,338  | 7,390  | 8,091  | 27.3            | 19.1                                   | 9.5                            |
| Hypertension                             | 1,148  | 1,483  | 1,932  | 2,456  | 2,930  | 3,397  | 11.4            | 24.2                                   | 15.9                           |
| Polycystic kidney disease                | 569    | 813    | 1,026  | 1,352  | 1,704  | 2,036  | 6.9             | 29.0                                   | 19.5                           |
| Interstitial nephropathy                 | 422    | 581    | 801    | 986    | 1,157  | 1,259  | 4.2             | 24.4                                   | 8.8                            |
| Obstructive nephropathy                  | 496    | 544    | 613    | 711    | 774    | 799    | 2.7             | 10.0                                   | 3.2                            |
| Other                                    | 538    | 821    | 1,117  | 1,471  | 1,710  | 1,937  | 6.5             | 29.2                                   | 13.3                           |
| Unknown                                  | 4,656  | 4,978  | 5,368  | 6,037  | 6,584  | 6,917  | 23.3            | 8.2                                    | 5.1                            |

NOTES: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1983-88.

**Table 12**  
**Medicare end stage renal disease program enrollment per million population for patients with functioning grafts, by age, sex, race, and primary diagnosis: 1983-88**

| Age, sex, race,<br>and primary diagnosis | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | Average<br>annual<br>percent<br>increase | Percent<br>increase<br>1987-88 |
|--|------|------|------|------|------|------|--|--------------------------------|
|  |      |      |      |      |      |      | Number of patients per million           |                                |
| Total                                    | 55   | 67   | 81   | 97   | 111  | 121  | 16.9                                     | 8.8                            |
| <b>Age</b>                               |      |      |      |      |      |      |  |                                |
| Under 15 years                           | 8    | 10   | 13   | 14   | 15   | 16   | 13.6                                     | 4.6                            |
| 15-24 years                              | 41   | 46   | 53   | 60   | 64   | 64   | 9.1                                      | -0.3                           |
| 25-34 years                              | 94   | 110  | 124  | 143  | 152  | 154  | 10.4                                     | 1.6                            |
| 35-44 years                              | 116  | 140  | 168  | 199  | 222  | 237  | 15.5                                     | 7.2                            |
| 45-54 years                              | 107  | 132  | 164  | 202  | 241  | 267  | 20.0                                     | 10.4                           |
| 55-64 years                              | 50   | 68   | 88   | 119  | 151  | 184  | 29.5                                     | 22.0                           |
| 65-74 years                              | 9    | 12   | 18   | 27   | 40   | 55   | 43.9                                     | 39.1                           |
| 75 years or over                         | 0    | 1    | 1    | 2    | 3    | 3    | 63.2                                     | 20.8                           |
| <b>Sex</b>                               |      |      |      |      |      |      |  |                                |
| Male                                     | 72   | 87   | 105  | 126  | 143  | 155  | 16.6                                     | 7.7                            |
| Female                                   | 40   | 48   | 58   | 70   | 81   | 89   | 17.5                                     | 10.6                           |
| <b>Race</b>                              |      |      |      |      |      |      |  |                                |
| Asian                                    | 35   | 53   | 69   | 97   | 122  | 143  | 32.6                                     | 17.3                           |
| Black                                    | 81   | 100  | 123  | 147  | 167  | 183  | 17.9                                     | 10.0                           |
| White                                    | 50   | 61   | 74   | 89   | 102  | 110  | 16.9                                     | 8.2                            |
| American Indian                          | 89   | 88   | 110  | 128  | 153  | 174  | 14.5                                     | 13.6                           |
| Other/unknown                            | —    | —    | —    | —    | —    | —    | —  | —                              |
| <b>Diagnosis</b>                         |      |      |      |      |      |      |  |                                |
| Diabetes                                 | 7    | 9    | 12   | 16   | 19   | 21   | 26.2                                     | 12.9                           |
| Glomerulonephritis                       | 14   | 18   | 22   | 26   | 30   | 33   | 18.0                                     | 8.6                            |
| Hypertension                             | 5    | 6    | 8    | 10   | 12   | 14   | 23.1                                     | 15.0                           |
| Polycystic kidney disease                | 2    | 3    | 4    | 6    | 7    | 8    | 27.9                                     | 18.6                           |
| Interstitial nephropathy                 | 2    | 2    | 3    | 4    | 5    | 5    | 23.3                                     | 8.0                            |
| Obstructive nephropathy                  | 2    | 2    | 3    | 3    | 3    | 3    | 9.0                                      | 2.4                            |
| Other                                    | 2    | 3    | 5    | 6    | 7    | 8    | 28.0                                     | 12.4                           |
| Unknown                                  | 20   | 21   | 22   | 25   | 27   | 28   | 7.2                                      | 4.2                            |

NOTES: All calculations are based on unrounded numbers. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1983-88.

# Patient treatment trends

## Treatment trends

The statistics in this section are taken from the ESRD Facility Survey, Form HCFA-2744. The exception is Table 18, which is based on counts of transplant records (HCFA-2745-U4) linked with beneficiary entitlement data in the PMMIS. The facility survey covers all patients receiving services at Medicare-approved dialysis facilities and transplant centers. All figures shown are as of December 31 for each year. Because they include both Medicare entitled and non-Medicare patients, these numbers are not comparable to those for the Medicare ESRD population presented in other sections of this report. Also, because only Medicare-approved facilities are surveyed, the numbers do not represent the entire U.S. ESRD population. These caveats must be kept in mind when using Tables 13-17 and 19.

## Dialysis patients

Data for dialysis patients by Medicare and non-Medicare categories for years 1980 through 1989 are shown in Table 13.

The total number of dialysis patients increased by 9.6 percent during 1989. The number of Medicare covered dialysis patients increased by 9.4 percent and non-Medicare patients increased by 12.3 percent for the same year.

The average annual rate of increase in the total number of patients dialyzing from 1980 through 1989 was 9.3 percent. The average annual rate of increase for Medicare covered patients was 9.2 percent and for non-Medicare patients was 10.0 percent.

Over the most recent 5 years, the increase in the number of dialysis patients has fluctuated between 7.2 percent and 9.6 percent, annually.

Data on the ESRD dialysis population, by type and place of dialysis for the years 1984 through 1989, are shown in Table 14. During these years, the total number of dialysis patients, for the facilities reporting, increased from 78,483 in 1984 to 116,169 in 1989, or an average annual growth rate of 8.2 percent.<sup>1</sup>

By far, the most common dialysis modality is outpatient hemodialysis. Patients receiving dialysis in this modality increased from 62,174 in 1984 (79.2 percent of all dialysis

patients) to 95,371 in 1989 (82.1 percent of all dialysis patients). Further, in 1989, the hemodialysis modality accounted for 99.4 percent of those patients dialyzing in-unit (see outpatient). The remaining .6 percent of in-unit patients were using peritoneal dialysis. The average annual rate of change also reflects the trend toward increased use of in-unit hemodialysis (8.9 percent) and decreased use of in-unit peritoneal dialysis (-11.6 percent).

There were 20,221 patients dialyzing at home in 1989, which was 17.4 percent of all dialysis patients. This represents a net decrease from 1984 when there were 15,238 home patients, representing 19.4 percent of all dialysis patients. Within the home dialysis population, CAPD was consistently the most frequently selected modality for dialysis. There were 14,830 patients in this group in 1989, compared to 5,391 for all other at-home modalities. However, CCPD was the fastest growing treatment, compared to both in-unit and other home patient categories. The average annual rate of increase for CCPD from 1984 to 1989 was 21.9 percent; the recent increase from 1988 to 1989 was 20.2 percent. CAPD grew at the same rate (8.2 percent per year) as the total dialysis population); however, the use of both home hemodialysis and home peritoneal dialysis decreased during this period (-6.7 and -8.5 percent, respectively).

A comparison of the data for all in-unit (see outpatient) patients to all home patients shows that the use of in-unit services grew at the faster rate. From 1984 to 1989, the average annual percent change for the combined in-unit modalities was 8.7 percent; for the combined home dialysis modalities, the average annual percent change from 1984 to 1989 was 5.8 percent.

The number of persons completing self-dialysis training is shown in Table 15. The number of patients completing home dialysis training is not growing as fast as the overall number of dialysis patients. As shown in Table 14, the average annual percent growth in the overall number of dialysis patients from 1984 to 1989 was 8.2 percent. The average annual percent growth in the number of dialysis patients completing training for the same period was 7.8 percent. The data in Table 15 support the finding in Table 14 that CCPD was the fastest growing treatment. The average annual rate of increase for CCPD was 22.7 percent; the next highest average annual rate of increase was for CAPD at 8.4 percent.

<sup>1</sup>Please note that, for Table 14, comparisons of the various categories of patients on dialysis exclude those in training to learn to self-dialyze. This is because these patients may ultimately select any one of the available modalities and they may elect to dialyze in-unit or at home; however, this information is not complete enough to categorize them at the time of the survey.

**Table 13**  
**Dialysis patients, by Medicare coverage: 1980-1989<sup>1</sup>**

| Year                          | Total   |                   | Medicare |                   | Non-Medicare |                   |
|-------------------------------|---------|-------------------|----------|-------------------|--------------|-------------------|
|                               | Number  | Percent<br>change | Number   | Percent<br>change | Number       | Percent<br>change |
|                               |         |                   |          |                   |              |                   |
| 1980                          | 52,364  | —                 | 48,665   | —                 | 3,699        | —                 |
| 1981                          | 58,924  | 12.5              | 55,127   | 13.3              | 3,797        | 2.7               |
| 1982                          | 65,765  | 11.6              | 61,782   | 12.1              | 3,983        | 4.9               |
| 1983                          | 71,987  | 9.5               | 67,569   | 9.4               | 4,418        | 10.9              |
| 1984                          | 78,483  | 9.0               | 73,485   | 8.8               | 4,998        | 13.1              |
| 1985                          | 84,797  | 8.0               | 79,134   | 7.7               | 5,663        | 13.3              |
| 1986                          | 90,886  | 7.2               | 84,815   | 7.2               | 6,071        | 7.2               |
| 1987                          | 98,432  | 8.3               | 91,361   | 7.7               | 7,071        | 16.5              |
| 1988                          | 105,958 | 7.7               | 98,191   | 7.5               | 7,767        | 9.8               |
| 1989                          | 116,169 | 9.6               | 107,447  | 9.4               | 8,722        | 12.3              |
| Average annual percent change |         |                   |          |                   |              |                   |
| 1980-89                       | —       | 9.3               | —        | 9.2               | —            | 10.0              |

<sup>1</sup>Counts as of December 31 of each year from the End Stage Renal Disease Facility Surveys.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1980-89.

**Table 14**  
**End stage renal disease dialysis population, by type and place of dialysis: 1984-89<sup>1</sup>**

| Type and place of dialysis | 1984   | 1985   | 1986   | 1987   | 1988    | 1989    | Average<br>annual<br>percent<br>change | Percent<br>change<br>1988-89 |
|----------------------------|--------|--------|--------|--------|---------|---------|--|------------------------------|
|                            |        |        |        |        |         |         | Number of patients                     |                              |
| Total                      | 78,483 | 84,797 | 90,886 | 98,432 | 105,958 | 116,169 | 8.2                                    | 9.6                          |
| Outpatient hemodialysis    | 62,174 | 67,241 | 72,756 | 79,352 | 86,250  | 95,371  | 8.9                                    | 10.6                         |
| Outpatient peritoneal      | 590    | 584    | 510    | 440    | 365     | 319     | -11.6                                  | -12.6                        |
| Home hemodialysis          | 4,125  | 3,983  | 3,675  | 3,582  | 3,197   | 2,914   | -6.7                                   | -8.9                         |
| Home peritoneal            | 259    | 231    | 191    | 168    | 326     | 166     | -8.5                                   | -49.1                        |
| CAPD <sup>2</sup>          | 9,995  | 11,236 | 11,913 | 12,825 | 13,318  | 14,830  | 8.2                                    | 11.4                         |
| CCPD <sup>3</sup>          | 859    | 953    | 1,307  | 1,708  | 1,922   | 2,311   | 21.9                                   | 20.2                         |
| Self training              | 481    | 569    | 534    | 357    | 580     | 258     | -11.7                                  | -55.5                        |

<sup>1</sup>Counts are as of December 31 of each year from the End Stage Renal Disease Facility Surveys.

<sup>2</sup>Continuous ambulatory peritoneal dialysis.

<sup>3</sup>Continuous cycling peritoneal dialysis.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1984-89

**Table 15**  
**Dialysis patients completing training, by type of dialysis: 1984-89**

| Type of dialysis                               | 1984  | 1985  | 1986  | 1987  | 1988   | 1989   | Average annual percent change | Percent change 1988-89 |
|--|-------|-------|-------|-------|--------|--------|-------------------------------|------------------------|
| Number of patients                             |       |       |       |       |        |        |                               |                        |
| Total completed dialysis training <sup>1</sup> | 7,586 | 8,548 | 8,706 | 9,477 | 10,445 | 11,032 | 7.8                           | 5.6                    |
| Hemodialysis                                   | 1,086 | 1,047 | 874   | 823   | 983    | 800    | -5.9                          | -18.6                  |
| Peritoneal                                     | 247   | 165   | 141   | 212   | 191    | 138    | -11.0                         | -27.7                  |
| CAPD <sup>2</sup>                              | 5,691 | 6,584 | 6,723 | 7,184 | 7,882  | 8,529  | 8.4                           | 8.2                    |
| CCPD <sup>3</sup>                              | 562   | 752   | 968   | 1,258 | 1,389  | 1,565  | 22.7                          | 12.7                   |

<sup>1</sup> Includes a small percentage of hemodialysis and peritoneal dialysis patients who completed training during the year for self-care outpatient dialysis.

<sup>2</sup> Continuous ambulatory peritoneal dialysis.

<sup>3</sup> Continuous cycling peritoneal dialysis

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey,

## Transplant patients

Data for kidney transplants, by Medicare and non-Medicare categories, are shown in Table 16. During the years 1980 through 1986, the number of persons receiving a kidney transplant increased from 4,676 to 8,948, an average increase of 11.4 percent per year. However, from 1986 to 1989 there was a slight drop in patients receiving a transplant (8,948 to 8,885, respectively). The average annual rate of increase in transplanted patients from 1980 through 1989 was 7.4 percent. The average annual rate of increase was similar for Medicare covered transplants (7.4 percent) and non-Medicare covered transplants (7.3 percent). In 1989, 91.3 percent of all kidney transplants were covered by Medicare.

Kidney transplants by donor type are shown in Table 17. The overall trends are very similar to those in Table 16. The number of kidney transplants is slightly higher than the number of transplanted patients because a few patients receive more than one transplant during a calendar year. Cadaver donor transplants increased at a faster rate than did living-related donor transplants during the 1980 through 1989 period (8.3 percent and 4.0 percent annual rates of increase, respectively). In 1980, cadaver donor transplants accounted for 72.9 percent of all reported kidney transplants. By 1989, this had risen to 78.7 percent. Beginning in 1988, living donor transplants were reported as living-related and living unrelated. Thus, some of the 7.7 percent decrease in living-related donor transplants between 1987 and 1988 is a reporting artifact. There were 1,823 living-related donor transplants in 1989, representing 20.5 percent of all reported kidney transplants, and there were 70 living-unrelated donor transplants, representing the remaining 0.8 percent of all reported kidney transplants.

Trends in kidney transplantation by age, sex, race, and diagnostic category are shown in Table 18. (As stated above, figures in Tables 16 and 18 will not be exactly comparable because the data are compiled from two different sources.) In 1983, there were 5,685 Medicare entitled persons who received a kidney transplant. By 1988, the number was 8,228, an average annual increase of

7.7 percent. However, all of the increase occurred between 1983 and 1986, when the number of Medicare transplant patients peaked at 8,493. From 1987 to 1989 there were slight declines in the number of Medicare patients receiving a transplant. This decline corresponds to the overall decline in kidney transplants between 1986 and 1989 reflected in Table 17.

There has been a significant shift in the age distribution of transplant recipients. In 1983, persons under the age of 35 accounted for over one-half (51.5 percent) of all transplant recipients. The number of transplant recipients in these age groups increased by an average rate of increase of only 1.7 percent through 1988 at which point they accounted for 38.0 percent of transplant recipients. The average annual increase in number of transplant recipients in the 35 and over age groups was 12.7 percent. The average age of transplant recipients increased from 35.4 years in 1983 to 39.5 years in 1988.

Transplants have increased more rapidly among females than among males (8.7 percent versus 7.1 percent average annual rate of increase, respectively). Females accounted for 37.3 percent of Medicare transplant recipients in 1983 and 39.1 percent in 1988.

American Indians and Asians had the highest average annual rates of growth in numbers of transplant recipients at 14.1 percent and 10.7 percent, respectively. However, due to the small number of Medicare ESRD beneficiaries in these two groups, they still account for only 3.2 percent of all transplant recipients. Increases in number of transplant recipients were relatively similar for black (7.7 percent per year) and white beneficiaries (7.4 percent per year). In 1988, 20.7 percent of Medicare kidney transplant recipients were black and 75.3 percent were white.

The number of Medicare transplant recipients increased most rapidly for persons whose renal failure was attributed to polycystic kidney disease (15.5 percent per year), diabetes (13.6 percent per year), and hypertension (11.6 percent per year). In 1988, persons whose renal failure was attributed to glomerulonephritis, diabetes, and hypertension accounted for 27.2, 19.5, and 13.5 percent of all transplant recipients, respectively.

From 1983 to 1989, the number of persons awaiting kidney transplants increased from 7,176 to 14,687, an average annual increase of 12.7 percent (Table 19). In 1983, 10.0 percent of all dialysis patients were awaiting a

transplant. By 1989 this had increased to 12.6 percent. From 1986 to 1989, the percent of total patients awaiting a kidney transplant remained relatively constant at just over 12 percent.

**Table 16**  
**Kidney transplant patients, by Medicare coverage: 1980-89**

| Year                          | Total  |                | Medicare coverage |                |              |                |
|-------------------------------|--------|----------------|-------------------|----------------|--------------|----------------|
|                               | Number | Percent change | Medicare          |                | Non-Medicare |                |
|                               |        |                | Number            | Percent change | Number       | Percent change |
| 1980                          | 4,676  | —              | 4,266             | —              | 410          | —              |
| 1981                          | 4,898  | 4.7            | 4,440             | 4.1            | 458          | 11.7           |
| 1982                          | 5,252  | 7.2            | 4,846             | 9.1            | 406          | -11.4          |
| 1983                          | 6,098  | 16.1           | 5,591             | 15.4           | 507          | 24.9           |
| 1984                          | 6,933  | 13.7           | 6,304             | 12.8           | 629          | 24.1           |
| 1985                          | 7,676  | 10.7           | 7,073             | 12.2           | 603          | -4.1           |
| 1986                          | 8,948  | 16.6           | 8,258             | 16.8           | 690          | 14.4           |
| 1987                          | 8,949  | 0.0            | 8,298             | 0.5            | 651          | -5.7           |
| 1988                          | 8,909  | -0.4           | 8,175             | -1.5           | 734          | 12.7           |
| 1989                          | 8,885  | -0.3           | 8,111             | -0.8           | 774          | 5.4            |
| Average annual percent change |        |                |                   |                |              |                |
| 1980-89                       | —      | 7.4            | —                 | 7.4            | —            | 7.3            |

NOTE: Average annual percent change calculated by use of compounding.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1980-89.

**Table 17**  
**Kidney transplants, by donor type: 1980-89**

| Year                          | Total  |                | Donor type |                |                |                |                               |                |
|-------------------------------|--------|----------------|------------|----------------|----------------|----------------|-------------------------------|----------------|
|                               | Number | Percent change | Cadaver    |                | Living-related |                | Living-unrelated <sup>1</sup> |                |
|                               |        |                | Number     | Percent change | Number         | Percent change | Number                        | Percent change |
| 1980                          | 4,704  | —              | 3,427      | —              | 1,277          | —              | —                             | —              |
| 1981                          | 4,905  | 4.3            | 3,445      | 0.5            | 1,460          | 14.3           | —                             | —              |
| 1982                          | 5,358  | 9.2            | 3,681      | 6.9            | 1,677          | 14.9           | —                             | —              |
| 1983                          | 6,112  | 14.1           | 4,328      | 17.6           | 1,784          | 6.4            | —                             | —              |
| 1984                          | 6,968  | 14.0           | 5,264      | 21.6           | 1,704          | -4.5           | —                             | —              |
| 1985                          | 7,695  | 10.4           | 5,819      | 10.5           | 1,876          | 10.1           | —                             | —              |
| 1986                          | 8,976  | 16.6           | 7,089      | 21.8           | 1,887          | 0.6            | —                             | —              |
| 1987                          | 8,967  | -0.1           | 7,060      | -0.4           | 1,907          | 1.1            | —                             | —              |
| 1988                          | 8,932  | -0.4           | 7,116      | 0.8            | 1,760          | -7.7           | 56                            | —              |
| 1989                          | 8,899  | -0.4           | 7,006      | -1.5           | 1,823          | 3.6            | 70                            | 25.0           |
| Average annual percent change |        |                |            |                |                |                |                               |                |
| 1980-89                       | —      | 7.3            | —          | 8.3            | —              | 4.0            | —                             | 25.0           |

<sup>1</sup>The living-unrelated category was added to the End Stage Renal Disease Facility Survey in 1989.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1980-89

**Table 18**  
**Medicare end stage renal disease program transplants,  
by age, sex, race, and primary diagnosis: 1983-88**

| Age, sex, race,<br>and primary diagnosis | 1983  | 1984  | 1985  | 1986  | 1987  | 1988  | Percent<br>1988 | Average<br>annual<br>percent<br>increase | Percent<br>increase<br>1987-88 |
|--|-------|-------|-------|-------|-------|-------|-----------------|--|--------------------------------|
| Total                                    | 5,685 | 6,502 | 7,195 | 8,493 | 8,374 | 8,228 | 100.0           | 7.7                                      | -1.7                           |
| <b>Age</b>                               |       |       |       |       |       |       |                 |  |                                |
| Under 15 years                           | 316   | 383   | 394   | 383   | 414   | 359   | 4.4             | 2.6                                      | -13.3                          |
| 15-24 years                              | 897   | 916   | 974   | 1,062 | 941   | 880   | 10.7            | -0.4                                     | -6.5                           |
| 25-34 years                              | 1,665 | 1,785 | 1,836 | 2,218 | 1,948 | 1,889 | 23.0            | 2.6                                      | -3.0                           |
| 35-44 years                              | 1,414 | 1,667 | 1,901 | 2,176 | 2,237 | 2,174 | 26.4            | 9.0                                      | -2.8                           |
| 45-54 years                              | 982   | 1,175 | 1,379 | 1,666 | 1,677 | 1,679 | 20.4            | 11.3                                     | 0.1                            |
| 55-64 years                              | 379   | 527   | 639   | 867   | 980   | 1,033 | 12.6            | 22.2                                     | 5.4                            |
| 65-74 years                              | 32    | 45    | 66    | 117   | 173   | 207   | 2.5             | 45.3                                     | 19.7                           |
| 75 years or over                         | 0     | 4     | 6     | 4     | 4     | 7     | 0.1             | —  | 75.0                           |
| <b>Sex</b>                               |       |       |       |       |       |       |                 |  |                                |
| Male                                     | 3,566 | 4,085 | 4,502 | 5,304 | 5,176 | 5,014 | 60.9            | 7.1                                      | -3.1                           |
| Female                                   | 2,119 | 2,417 | 2,693 | 3,189 | 3,198 | 3,214 | 39.1            | 8.7                                      | 0.5                            |
| <b>Race</b>                              |       |       |       |       |       |       |                 |  |                                |
| Asian                                    | 103   | 111   | 109   | 163   | 188   | 171   | 2.1             | 10.7                                     | -9.0                           |
| Black                                    | 1,177 | 1,345 | 1,514 | 1,708 | 1,675 | 1,703 | 20.7            | 7.7                                      | 1.7                            |
| White                                    | 4,334 | 4,973 | 5,476 | 6,514 | 6,394 | 6,198 | 75.3            | 7.4                                      | -3.1                           |
| American Indian                          | 48    | 59    | 69    | 75    | 84    | 93    | 1.1             | 14.1                                     | 10.7                           |
| Other/unknown                            | 23    | 14    | 27    | 33    | 33    | 63    | 0.8             | 22.3                                     | 90.9                           |
| <b>Diagnosis</b>                         |       |       |       |       |       |       |                 |  |                                |
| Diabetes                                 | 847   | 1,086 | 1,331 | 1,679 | 1,617 | 1,604 | 19.5            | 13.6                                     | -0.8                           |
| Glomerulonephritis                       | 1,652 | 1,938 | 1,997 | 2,294 | 2,326 | 2,237 | 27.2            | 6.3                                      | -3.8                           |
| Hypertension                             | 640   | 715   | 871   | 1,028 | 1,078 | 1,108 | 13.5            | 11.6                                     | 2.8                            |
| Polycystic kidney disease                | 309   | 416   | 459   | 598   | 657   | 636   | 7.7             | 15.5                                     | -3.2                           |
| Interstitial nephropathy                 | 266   | 287   | 371   | 398   | 389   | 315   | 3.8             | 3.4                                      | -19.0                          |
| Obstructive nephropathy                  | 179   | 171   | 187   | 227   | 194   | 152   | 1.8             | -3.2                                     | -21.6                          |
| Other                                    | 393   | 515   | 566   | 682   | 642   | 645   | 7.8             | 10.4                                     | 0.5                            |
| Unknown                                  | 1,399 | 1,374 | 1,413 | 1,587 | 1,471 | 1,531 | 18.6            | 1.8                                      | 4.1                            |

NOTES: All calculations are based on unrounded numbers. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1983-88.

**Table 19**  
**Patients awaiting transplants: 1983-89**

| Year                            | Number of patients | Percent increase | Percent of dialysis population |
|---------------------------------|--------------------|------------------|--------------------------------|
| 1983                            | 7,176              | —                | 10.0                           |
| 1984                            | 8,562              | 19.3             | 10.9                           |
| 1985                            | 9,791              | 14.4             | 11.5                           |
| 1986                            | 11,108             | 13.5             | 12.2                           |
| 1987                            | 12,140             | 9.3              | 12.3                           |
| 1988                            | 13,282             | 9.4              | 12.5                           |
| 1989                            | 14,687             | 10.6             | 12.6                           |
| Average annual percent increase |                    |                  |                                |
| 1983-89                         | —                  | 12.7             | —                              |

NOTE: Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1983-89.

## End stage renal disease facility data and patient counts

The information presented in Tables 20 through 33 was collected through the use of the ESRD Facility Survey, Form HCFA-2744, and covers the period of January 1, 1989 through December 31, 1989. The rate of compliance of surveyed facilities in completing the ESRD Facility Survey was 100 percent for 1989. It is important to note that the number of facilities surveyed and reporting, as summarized in Tables 20 through 33, does not equal the total number of Medicare-approved providers of renal care as reported in Tables 52, 53, and 54. Some Medicare-approved hospitals were not surveyed because they provide acute dialysis only or they serve as a backup to a chronic dialysis facility; i.e., they do not provide routine maintenance dialysis for ESRD patients. Other Medicare-approved renal providers were not requested to complete

an ESRD Facility Survey because they were so recently certified that there was insufficient time to include them in the survey population. Consequently, the renal facilities counts reported in Tables 20 through 33 are not directly comparable to the provider counts in Tables 52, 53, and 54.

It must also be noted that this Section includes only Medicare-approved renal providers and, thus, this section does not reflect all renal dialysis facilities in the country. There are a number of facilities providing chronic dialysis services (such as several Department of Veterans Affairs and Department of Defense facilities), that are not Medicare-approved and are not included in Tables 20 to 33. A brief summary of the Department of Veterans Affairs is provided in Table 34. Therefore, due to slight differences in reporting facilities and some imprecision in determining Medicare dialysis status, the survey data will not agree with the PMMIS enrollment data shown in Tables 8 through 12.

The survey tables (Tables 20 through 33) are arrayed either nationally or by State. Tables 23 through 26 provide aggregate dialysis patient population figures as of December 31, 1989 (end of the survey period). The other tables reflect activity for the entire survey period, unless otherwise noted. Tables 21, 22, 29, and 31 display patients by Medicare status: Currently enrolled in Medicare, Medicare application pending, and non-Medicare. Patients appearing in the non-Medicare category may include those who are covered by the Department of Veterans Affairs, those who are covered by private insurance, those who are covered by Medicaid, and foreign nationals.

In the 1989 facility survey we found that, as of December 31, 1989, 86.8 percent of all ESRD patients were entitled to Medicare benefits; 5.7 percent had applications for Medicare entitlement pending; and 7.5 percent were not eligible for Medicare. (See Tables 21 and 29.)

We estimate that approximately 300 home hemodialysis patients are not included in the facility survey counts. This is due to idiosyncratic reporting of several health care delivery entities.

**Table 20**  
**End stage renal disease facilities surveyed, by State: 1989**

| State                | Dialysis facilities<br>surveyed | Transplant centers<br>surveyed |
|----------------------|---------------------------------|--------------------------------|
| Total                | 1,867                           | 217                            |
| Alabama              | 35                              | 2                              |
| Alaska               | 2                               | 0                              |
| Arizona              | 37                              | 4                              |
| Arkansas             | 30                              | 3                              |
| California           | 209                             | 22                             |
| Colorado             | 16                              | 3                              |
| Connecticut          | 19                              | 2                              |
| Delaware             | 7                               | 0                              |
| District of Columbia | 19                              | 5                              |
| Florida              | 136                             | 6                              |
| Georgia              | 75                              | 6                              |
| Hawaii               | 12                              | 1                              |
| Idaho                | 7                               | 0                              |
| Illinois             | 75                              | 8                              |
| Indiana              | 33                              | 2                              |
| Iowa                 | 12                              | 3                              |
| Kansas               | 15                              | 2                              |
| Kentucky             | 21                              | 3                              |
| Louisiana            | 62                              | 7                              |
| Maine                | 6                               | 1                              |
| Maryland             | 42                              | 3                              |
| Massachusetts        | 30                              | 10                             |
| Michigan             | 43                              | 9                              |
| Minnesota            | 26                              | 4                              |
| Mississippi          | 29                              | 1                              |
| Missouri             | 44                              | 9                              |
| Montana              | 6                               | 0                              |
| Nebraska             | 11                              | 3                              |
| Nevada               | 5                               | 1                              |
| New Hampshire        | 5                               | 0                              |
| New Jersey           | 34                              | 3                              |
| New Mexico           | 16                              | 2                              |
| New York             | 111                             | 15                             |
| North Carolina       | 54                              | 5                              |
| North Dakota         | 7                               | 2                              |
| Ohio                 | 48                              | 12                             |
| Oklahoma             | 27                              | 6                              |
| Oregon               | 11                              | 1                              |
| Pennsylvania         | 94                              | 10                             |
| Puerto Rico          | 17                              | 1                              |
| Rhode Island         | 6                               | 0                              |
| South Carolina       | 45                              | 1                              |
| South Dakota         | 9                               | 0                              |
| Tennessee            | 51                              | 7                              |
| Texas                | 128                             | 16                             |
| Utah                 | 12                              | 2                              |
| Vermont              | 1                               | 1                              |
| Virgin Islands       | 2                               | 0                              |
| Virginia             | 55                              | 3                              |
| Washington           | 19                              | 5                              |
| West Virginia        | 14                              | 2                              |
| Wisconsin            | 33                              | 3                              |
| Wyoming              | 1                               | 0                              |
| American Samoa       | 1                               | 0                              |
| Guam                 | 1                               | 0                              |
| Mariana Islands      | 1                               | 0                              |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 21**  
**Dialysis patient eligibility status, by State: 1989**

| State                | Facilities reporting | Total dialysis patients | Eligibility status             |                              |              |
|----------------------|----------------------|-------------------------|--------------------------------|------------------------------|--------------|
|                      |                      |                         | Currently enrolled in Medicare | Medicare application pending | Non-Medicare |
| Total                | 1,867                | 116,169                 | 100,857                        | 6,590                        | 8,722        |
| Alabama              | 35                   | 2,595                   | 2,305                          | 99                           | 191          |
| Alaska               | 2                    | 57                      | 47                             | 7                            | 3            |
| Arizona              | 37                   | 1,655                   | 1,308                          | 97                           | 250          |
| Arkansas             | 30                   | 1,001                   | 892                            | 63                           | 46           |
| California           | 209                  | 13,165                  | 10,848                         | 866                          | 1,451        |
| Colorado             | 16                   | 1,024                   | 875                            | 78                           | 71           |
| Connecticut          | 19                   | 1,470                   | 1,325                          | 73                           | 72           |
| Delaware             | 7                    | 283                     | 253                            | 6                            | 24           |
| District of Columbia | 19                   | 1,030                   | 782                            | 67                           | 181          |
| Florida              | 136                  | 6,257                   | 5,583                          | 256                          | 418          |
| Georgia              | 75                   | 3,665                   | 3,317                          | 112                          | 236          |
| Hawaii               | 12                   | 696                     | 620                            | 44                           | 32           |
| Idaho                | 7                    | 194                     | 178                            | 10                           | 6            |
| Illinois             | 75                   | 5,212                   | 4,291                          | 418                          | 503          |
| Indiana              | 33                   | 2,336                   | 2,156                          | 136                          | 44           |
| Iowa                 | 12                   | 837                     | 783                            | 32                           | 22           |
| Kansas               | 15                   | 823                     | 747                            | 40                           | 36           |
| Kentucky             | 21                   | 1,315                   | 1,134                          | 106                          | 75           |
| Louisiana            | 62                   | 2,725                   | 2,349                          | 209                          | 167          |
| Maine                | 6                    | 298                     | 268                            | 15                           | 15           |
| Maryland             | 42                   | 2,421                   | 2,064                          | 146                          | 211          |
| Massachusetts        | 30                   | 2,305                   | 1,961                          | 111                          | 233          |
| Michigan             | 43                   | 3,903                   | 3,412                          | 295                          | 196          |
| Minnesota            | 26                   | 1,413                   | 1,253                          | 63                           | 97           |
| Mississippi          | 29                   | 1,762                   | 1,622                          | 65                           | 75           |
| Missouri             | 44                   | 2,355                   | 2,112                          | 135                          | 108          |
| Montana              | 6                    | 245                     | 229                            | 7                            | 9            |
| Nebraska             | 11                   | 542                     | 490                            | 29                           | 23           |
| Nevada               | 5                    | 454                     | 378                            | 24                           | 52           |
| New Hampshire        | 5                    | 287                     | 253                            | 12                           | 22           |
| New Jersey           | 34                   | 4,288                   | 3,700                          | 176                          | 412          |
| New Mexico           | 16                   | 684                     | 567                            | 33                           | 84           |
| New York             | 111                  | 9,784                   | 8,111                          | 718                          | 955          |
| North Carolina       | 54                   | 3,527                   | 3,227                          | 83                           | 217          |
| North Dakota         | 7                    | 232                     | 212                            | 14                           | 6            |
| Ohio                 | 48                   | 4,331                   | 3,695                          | 372                          | 264          |
| Oklahoma             | 27                   | 1,040                   | 902                            | 108                          | 30           |
| Oregon               | 11                   | 936                     | 867                            | 41                           | 28           |
| Pennsylvania         | 94                   | 6,155                   | 5,364                          | 341                          | 450          |
| Puerto Rico          | 17                   | 1,612                   | 1,419                          | 69                           | 124          |
| Rhode Island         | 6                    | 531                     | 495                            | 17                           | 19           |
| South Carolina       | 45                   | 2,196                   | 2,001                          | 78                           | 117          |
| South Dakota         | 9                    | 178                     | 168                            | 5                            | 5            |
| Tennessee            | 51                   | 2,657                   | 2,376                          | 108                          | 173          |
| Texas                | 128                  | 8,069                   | 7,099                          | 405                          | 565          |
| Utah                 | 12                   | 417                     | 396                            | 16                           | 5            |
| Vermont              | 1                    | 101                     | 92                             | 6                            | 3            |
| Virgin Islands       | 2                    | 37                      | 30                             | 5                            | 2            |
| Virginia             | 55                   | 3,185                   | 2,774                          | 156                          | 255          |
| Washington           | 19                   | 1,620                   | 1,438                          | 128                          | 54           |
| West Virginia        | 14                   | 656                     | 617                            | 18                           | 21           |
| Wisconsin            | 33                   | 1,486                   | 1,382                          | 63                           | 41           |
| Wyoming              | 1                    | 32                      | 30                             | 2                            | 0            |
| American Samoa       | 1                    | 20                      | 17                             | 2                            | 1            |
| Guam                 | 1                    | 52                      | 28                             | 5                            | 19           |
| Mariana Islands      | 1                    | 18                      | 15                             | 0                            | 3            |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 22**  
**Dialysis patient counts, by place of dialysis: 1989**

| Patient count                         | Total   | Percent | Place of dialysis |         |        |         |
|---------------------------------------|---------|---------|-------------------|---------|--------|---------|
|                                       |         |         | Outpatient        | Percent | Home   | Percent |
| Dialysis patients beginning survey    | 106,001 | —       | 87,358            | 82.41   | 18,643 | 17.59   |
| Additions                             | 69,683  | —       | 59,484            | 85.36   | 10,199 | 14.64   |
| New starts                            | 44,621  | 64.03   | 37,801            | 63.55   | 6,820  | 66.87   |
| Restarted                             | 655     | 0.94    | 565               | 0.95    | 90     | 0.88    |
| Transferred in                        | 21,892  | 31.42   | 19,015            | 31.97   | 2,877  | 28.21   |
| Returned after transplant             | 2,515   | 3.61    | 2,103             | 3.54    | 412    | 4.04    |
| Losses                                | 59,515  | —       | 50,484            | 84.83   | 9,031  | 15.17   |
| Deaths                                | 26,340  | 44.26   | 22,362            | 44.30   | 3,978  | 44.05   |
| Recovered functions                   | 1,536   | 2.58    | 1,338             | 2.65    | 198    | 2.19    |
| Transplanted                          | 7,509   | 12.62   | 5,657             | 11.21   | 1,852  | 20.51   |
| Transferred out                       | 22,315  | 37.49   | 19,521            | 38.67   | 2,794  | 30.94   |
| Discontinued dialysis                 | 1,515   | 2.55    | 1,335             | 2.64    | 180    | 1.99    |
| Lost to followup                      | 300     | 0.50    | 271               | 0.54    | 29     | 0.32    |
| Number needed to balance <sup>1</sup> | 0       | —       | -410              | —       | 410    | —       |
| Dialysis patients end of survey       | 116,169 | —       | 95,948            | 82.59   | 20,221 | 17.41   |
| Hemodialysis                          | 98,285  | 84.61   | 95,371            | 99.40   | 2,914  | 14.41   |
| IPD <sup>2</sup>                      | 485     | 0.42    | 319               | 0.33    | 166    | 0.82    |
| CAPD <sup>3</sup>                     | 15,060  | 12.96   | 230               | 0.24    | 14,830 | 73.34   |
| CCPD <sup>4</sup>                     | 2,339   | 2.01    | 28                | 0.03    | 2,311  | 11.43   |
| Medicare status                       | 116,169 | —       | —                 | —       | —      | —       |
| Medicare                              | 100,857 | 86.82   | —                 | —       | —      | —       |
| Medicare pending                      | 6,590   | 5.67    | —                 | —       | —      | —       |
| Non-Medicare                          | 8,722   | 7.51    | —                 | —       | —      | —       |

<sup>1</sup>Accurate counts are not always available because of the movement of home patients, self-care training, and in-unit backup dialysis.

<sup>2</sup>Intermittent peritoneal dialysis.

<sup>3</sup>Continuous ambulatory peritoneal dialysis.

<sup>4</sup>Continuous cycling peritoneal dialysis.

NOTE: Percents may not add to total because of rounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 23**  
**Patients receiving care outpatient, by State: December 31, 1989**

| State                | Facilities reporting | Total outpatients | Outpatient dialysis |                  | Self-dialysis training |                  |                   |
|----------------------|----------------------|-------------------|---------------------|------------------|------------------------|------------------|-------------------|
|                      |                      |                   | Hemo <sup>1</sup>   | IPD <sup>2</sup> | Hemo <sup>1</sup>      | IPD <sup>2</sup> | CAPD <sup>3</sup> |
| Total                | 1,867                | 95,948            | 95,216              | 309              | 155                    | 10               | 230               |
| Alabama              | 35                   | 2,162             | 2,153               | 0                | 0                      | 0                | 6                 |
| Alaska               | 2                    | 55                | 55                  | 0                | 0                      | 0                | 0                 |
| Arizona              | 37                   | 1,343             | 1,314               | 0                | 22                     | 0                | 5                 |
| Arkansas             | 30                   | 791               | 786                 | 3                | 1                      | 0                | 1                 |
| California           | 209                  | 11,727            | 11,690              | 1                | 20                     | 0                | 16                |
| Colorado             | 16                   | 777               | 774                 | 0                | 3                      | 0                | 0                 |
| Connecticut          | 19                   | 1,114             | 1,100               | 1                | 0                      | 0                | 13                |
| Delaware             | 7                    | 282               | 282                 | 0                | 0                      | 0                | 0                 |
| District of Columbia | 19                   | 925               | 924                 | 0                | 1                      | 0                | 0                 |
| Florida              | 136                  | 5,478             | 5,462               | 4                | 1                      | 0                | 9                 |
| Georgia              | 75                   | 3,099             | 3,080               | 13               | 1                      | 0                | 5                 |
| Hawaii               | 12                   | 635               | 634                 | 0                | 1                      | 0                | 0                 |
| Idaho                | 7                    | 151               | 151                 | 0                | 0                      | 0                | 0                 |
| Illinois             | 75                   | 4,508             | 4,465               | 26               | 6                      | 0                | 11                |
| Indiana              | 33                   | 1,645             | 1,635               | 0                | 3                      | 0                | 7                 |

See footnotes at end of table.

**Table 23—Continued**  
**Patients receiving care outpatient, by State: December 31, 1989**

| State           | Facilities reporting | Total outpatients | Outpatient dialysis |                  | Self-dialysis training |                  |                   |                   |
|-----------------|----------------------|-------------------|---------------------|------------------|------------------------|------------------|-------------------|-------------------|
|                 |                      |                   | Hemo <sup>1</sup>   | IPD <sup>2</sup> | Hemo <sup>1</sup>      | IPD <sup>2</sup> | CAPD <sup>3</sup> | CCPD <sup>4</sup> |
| Iowa            | 12                   | 590               | 587                 | 0                | 1                      | 0                | 2                 | 0                 |
| Kansas          | 15                   | 570               | 568                 | 0                | 1                      | 0                | 1                 | 0                 |
| Kentucky        | 21                   | 1,023             | 1,018               | 1                | 1                      | 0                | 3                 | 0                 |
| Louisiana       | 62                   | 2,410             | 2,410               | 0                | 0                      | 0                | 0                 | 0                 |
| Maine           | 6                    | 241               | 239                 | 0                | 2                      | 0                | 0                 | 0                 |
| Maryland        | 42                   | 2,059             | 2,049               | 3                | 2                      | 0                | 5                 | 0                 |
| Massachusetts   | 30                   | 1,860             | 1,860               | 0                | 0                      | 0                | 0                 | 0                 |
| Michigan        | 43                   | 2,821             | 2,775               | 27               | 3                      | 1                | 15                | 0                 |
| Minnesota       | 26                   | 1,177             | 1,175               | 1                | 1                      | 0                | 0                 | 0                 |
| Mississippi     | 29                   | 1,432             | 1,430               | 0                | 1                      | 0                | 1                 | 0                 |
| Missouri        | 44                   | 1,775             | 1,763               | 0                | 5                      | 1                | 4                 | 2                 |
| Montana         | 6                    | 143               | 139                 | 3                | 1                      | 0                | 0                 | 0                 |
| Nebraska        | 11                   | 284               | 282                 | 2                | 0                      | 0                | 0                 | 0                 |
| Nevada          | 5                    | 347               | 344                 | 0                | 1                      | 0                | 2                 | 0                 |
| New Hampshire   | 5                    | 217               | 217                 | 0                | 0                      | 0                | 0                 | 0                 |
| New Jersey      | 34                   | 3,351             | 3,270               | 60               | 8                      | 2                | 8                 | 3                 |
| New Mexico      | 16                   | 576               | 575                 | 0                | 0                      | 0                | 1                 | 0                 |
| New York        | 111                  | 8,095             | 7,964               | 78               | 26                     | 0                | 22                | 5                 |
| North Carolina  | 54                   | 2,767             | 2,754               | 0                | 0                      | 4                | 7                 | 2                 |
| North Dakota    | 7                    | 200               | 199                 | 0                | 0                      | 0                | 1                 | 0                 |
| Ohio            | 48                   | 3,479             | 3,461               | 3                | 0                      | 0                | 15                | 0                 |
| Oklahoma        | 27                   | 756               | 750                 | 4                | 1                      | 0                | 1                 | 0                 |
| Oregon          | 11                   | 580               | 578                 | 0                | 0                      | 0                | 2                 | 0                 |
| Pennsylvania    | 94                   | 5,198             | 5,160               | 18               | 9                      | 0                | 8                 | 3                 |
| Puerto Rico     | 17                   | 1,459             | 1,414               | 14               | 3                      | 0                | 28                | 0                 |
| Rhode Island    | 6                    | 474               | 472                 | 0                | 0                      | 0                | 2                 | 0                 |
| South Carolina  | 45                   | 2,018             | 2,014               | 0                | 0                      | 0                | 4                 | 0                 |
| South Dakota    | 9                    | 163               | 163                 | 0                | 0                      | 0                | 0                 | 0                 |
| Tennessee       | 51                   | 2,111             | 2,103               | 0                | 3                      | 1                | 4                 | 0                 |
| Texas           | 128                  | 7,030             | 6,963               | 38               | 15                     | 1                | 10                | 3                 |
| Utah            | 12                   | 334               | 334                 | 0                | 0                      | 0                | 0                 | 0                 |
| Vermont         | 1                    | 64                | 64                  | 0                | 0                      | 0                | 0                 | 0                 |
| Virgin Islands  | 2                    | 37                | 37                  | 0                | 0                      | 0                | 0                 | 0                 |
| Virginia        | 55                   | 2,681             | 2,674               | 1                | 2                      | 0                | 3                 | 1                 |
| Washington      | 19                   | 1,166             | 1,154               | 1                | 9                      | 0                | 2                 | 0                 |
| West Virginia   | 14                   | 523               | 519                 | 1                | 0                      | 0                | 3                 | 0                 |
| Wisconsin       | 33                   | 1,128             | 1,116               | 6                | 1                      | 0                | 3                 | 2                 |
| Wyoming         | 1                    | 27                | 27                  | 0                | 0                      | 0                | 0                 | 0                 |
| American Samoa  | 1                    | 20                | 20                  | 0                | 0                      | 0                | 0                 | 0                 |
| Guam            | 1                    | 52                | 52                  | 0                | 0                      | 0                | 0                 | 0                 |
| Mariana Islands | 1                    | 18                | 18                  | 0                | 0                      | 0                | 0                 | 0                 |

<sup>1</sup>Hemodialysis.

<sup>2</sup>Intermittent peritoneal dialysis.

<sup>3</sup>Continuous ambulatory peritoneal dialysis.

<sup>4</sup>Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 24**  
**Patients receiving care at home, by State: December 31, 1989**

| State                | Facilities reporting | Total home patients | Hemodialysis | IPD <sup>1</sup> | CAPD <sup>2</sup> | CCPD <sup>3</sup> |
|----------------------|----------------------|---------------------|--------------|------------------|-------------------|-------------------|
| Total                | 1,867                | 20,221              | 2,914        | 166              | 14,830            | 2,311             |
| Alabama              | 35                   | 433                 | 59           | 0                | 297               | 77                |
| Alaska               | 2                    | 2                   | 2            | 0                | 0                 | 0                 |
| Arizona              | 37                   | 312                 | 17           | 0                | 253               | 42                |
| Arkansas             | 30                   | 210                 | 23           | 0                | 158               | 29                |
| California           | 209                  | 1,438               | 86           | 0                | 1,136             | 216               |
| Colorado             | 16                   | 247                 | 49           | 4                | 166               | 28                |
| Connecticut          | 19                   | 356                 | 8            | 0                | 330               | 18                |
| Delaware             | 7                    | 1                   | 0            | 0                | 1                 | 0                 |
| District of Columbia | 19                   | 105                 | 3            | 0                | 84                | 18                |
| Florida              | 136                  | 779                 | 80           | 0                | 522               | 177               |
| Georgia              | 75                   | 566                 | 50           | 3                | 439               | 74                |
| Hawaii               | 12                   | 61                  | 9            | 0                | 43                | 9                 |
| Idaho                | 7                    | 43                  | 5            | 0                | 32                | 6                 |
| Illinois             | 75                   | 704                 | 132          | 0                | 511               | 61                |
| Indiana              | 33                   | 691                 | 82           | 0                | 590               | 19                |
| Iowa                 | 12                   | 247                 | 53           | 0                | 158               | 36                |
| Kansas               | 15                   | 253                 | 33           | 0                | 215               | 5                 |
| Kentucky             | 21                   | 292                 | 26           | 13               | 235               | 18                |
| Louisiana            | 62                   | 315                 | 33           | 0                | 248               | 34                |
| Maine                | 6                    | 57                  | 9            | 0                | 28                | 20                |
| Maryland             | 42                   | 362                 | 33           | 1                | 281               | 47                |
| Massachusetts        | 30                   | 445                 | 68           | 7                | 294               | 76                |
| Michigan             | 43                   | 1,082               | 70           | 20               | 933               | 59                |
| Minnesota            | 26                   | 236                 | 109          | 0                | 113               | 14                |
| Mississippi          | 29                   | 330                 | 153          | 0                | 161               | 16                |
| Missouri             | 44                   | 580                 | 57           | 18               | 443               | 62                |
| Montana              | 6                    | 102                 | 31           | 0                | 67                | 4                 |
| Nebraska             | 11                   | 258                 | 7            | 0                | 242               | 9                 |
| Nevada               | 5                    | 107                 | 25           | 0                | 73                | 9                 |
| New Hampshire        | 5                    | 70                  | 2            | 0                | 57                | 11                |
| New Jersey           | 34                   | 937                 | 133          | 17               | 676               | 111               |
| New Mexico           | 16                   | 108                 | 3            | 0                | 101               | 4                 |
| New York             | 111                  | 1,689               | 293          | 0                | 1,219             | 177               |
| North Carolina       | 54                   | 760                 | 65           | 14               | 547               | 134               |
| North Dakota         | 7                    | 32                  | 2            | 0                | 25                | 5                 |
| Ohio                 | 48                   | 852                 | 41           | 7                | 703               | 101               |
| Oklahoma             | 27                   | 284                 | 13           | 23               | 224               | 24                |
| Oregon               | 11                   | 356                 | 61           | 0                | 260               | 35                |
| Pennsylvania         | 94                   | 957                 | 111          | 4                | 691               | 151               |
| Puerto Rico          | 17                   | 153                 | 40           | 0                | 101               | 12                |
| Rhode Island         | 6                    | 57                  | 3            | 1                | 49                | 4                 |
| South Carolina       | 45                   | 178                 | 26           | 0                | 138               | 14                |
| South Dakota         | 9                    | 15                  | 0            | 0                | 11                | 4                 |
| Tennessee            | 51                   | 546                 | 123          | 13               | 356               | 54                |
| Texas                | 128                  | 1,039               | 143          | 3                | 704               | 189               |
| Utah                 | 12                   | 83                  | 39           | 0                | 41                | 3                 |
| Vermont              | 1                    | 37                  | 12           | 0                | 25                | 0                 |
| Virgin Islands       | 2                    | 0                   | 0            | 0                | 0                 | 0                 |
| Virginia             | 55                   | 504                 | 98           | 4                | 359               | 43                |
| Washington           | 19                   | 454                 | 341          | 13               | 87                | 13                |
| West Virginia        | 14                   | 133                 | 13           | 0                | 111               | 9                 |
| Wisconsin            | 33                   | 358                 | 40           | 1                | 287               | 30                |
| Wyoming              | 1                    | 5                   | 0            | 0                | 5                 | 0                 |
| American Samoa       | 1                    | 0                   | 0            | 0                | 0                 | 0                 |
| Guam                 | 1                    | 0                   | 0            | 0                | 0                 | 0                 |
| Mariana Islands      | 1                    | 0                   | 0            | 0                | 0                 | 0                 |

<sup>1</sup>Intermittent peritoneal dialysis.

<sup>2</sup>Continuous ambulatory peritoneal dialysis.

<sup>3</sup>Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 25**  
**Dialysis treatment setting of end stage renal disease patients, by State: 1989**

| State                | Facilities reporting | Total dialysis patients | Dialized outpatient |         | Dialized at home |         |
|----------------------|----------------------|-------------------------|---------------------|---------|------------------|---------|
|                      |                      |                         | Total               | Percent | Total            | Percent |
| Total                | 1,867                | 116,169                 | 95,948              | 82.6    | 20,221           | 17.4    |
| Alabama              | 35                   | 2,595                   | 2,162               | 83.3    | 433              | 16.7    |
| Alaska               | 2                    | 57                      | 55                  | 96.5    | 2                | 3.5     |
| Arizona              | 37                   | 1,655                   | 1,343               | 81.1    | 312              | 18.9    |
| Arkansas             | 30                   | 1,001                   | 791                 | 79.0    | 210              | 21.0    |
| California           | 209                  | 13,165                  | 11,727              | 89.1    | 1,438            | 10.9    |
| Colorado             | 16                   | 1,024                   | 777                 | 75.9    | 247              | 24.1    |
| Connecticut          | 19                   | 1,470                   | 1,114               | 75.8    | 356              | 24.2    |
| Delaware             | 7                    | 283                     | 282                 | 99.6    | 1                | 0.4     |
| District of Columbia | 19                   | 1,030                   | 925                 | 89.8    | 105              | 10.2    |
| Florida              | 136                  | 6,257                   | 5,478               | 87.5    | 779              | 12.5    |
| Georgia              | 75                   | 3,665                   | 3,099               | 84.6    | 566              | 15.4    |
| Hawaii               | 12                   | 696                     | 635                 | 91.2    | 61               | 8.8     |
| Idaho                | 7                    | 194                     | 151                 | 77.8    | 43               | 22.2    |
| Illinois             | 75                   | 5,212                   | 4,508               | 86.5    | 704              | 13.5    |
| Indiana              | 33                   | 2,336                   | 1,645               | 70.4    | 691              | 29.6    |
| Iowa                 | 12                   | 837                     | 590                 | 70.5    | 247              | 29.5    |
| Kansas               | 15                   | 823                     | 570                 | 69.3    | 253              | 30.7    |
| Kentucky             | 21                   | 1,315                   | 1,023               | 77.8    | 292              | 22.2    |
| Louisiana            | 62                   | 2,725                   | 2,410               | 88.4    | 315              | 11.6    |
| Maine                | 6                    | 298                     | 241                 | 80.9    | 57               | 19.1    |
| Maryland             | 42                   | 2,421                   | 2,059               | 85.0    | 362              | 15.0    |
| Massachusetts        | 30                   | 2,305                   | 1,860               | 80.7    | 445              | 19.3    |
| Michigan             | 43                   | 3,903                   | 2,821               | 72.3    | 1,082            | 27.7    |
| Minnesota            | 26                   | 1,413                   | 1,177               | 83.3    | 236              | 16.7    |
| Mississippi          | 29                   | 1,762                   | 1,432               | 81.3    | 330              | 18.7    |
| Missouri             | 44                   | 2,355                   | 1,775               | 75.4    | 580              | 24.6    |
| Montana              | 6                    | 245                     | 143                 | 58.4    | 102              | 41.6    |
| Nebraska             | 11                   | 542                     | 284                 | 52.4    | 258              | 47.6    |
| Nevada               | 5                    | 454                     | 347                 | 76.4    | 107              | 23.6    |
| New Hampshire        | 5                    | 287                     | 217                 | 75.6    | 70               | 24.4    |
| New Jersey           | 34                   | 4,288                   | 3,351               | 78.1    | 937              | 21.9    |
| New Mexico           | 16                   | 684                     | 576                 | 84.2    | 108              | 15.8    |
| New York             | 111                  | 9,784                   | 8,095               | 82.7    | 1,689            | 17.3    |
| North Carolina       | 54                   | 3,527                   | 2,767               | 78.5    | 760              | 21.5    |
| North Dakota         | 7                    | 232                     | 200                 | 86.2    | 32               | 13.8    |
| Ohio                 | 48                   | 4,331                   | 3,479               | 80.3    | 852              | 19.7    |
| Oklahoma             | 27                   | 1,040                   | 756                 | 72.7    | 284              | 27.3    |
| Oregon               | 11                   | 936                     | 580                 | 62.0    | 356              | 38.0    |
| Pennsylvania         | 94                   | 6,155                   | 5,198               | 84.5    | 957              | 15.5    |
| Puerto Rico          | 17                   | 1,612                   | 1,459               | 90.5    | 153              | 9.5     |
| Rhode Island         | 6                    | 531                     | 474                 | 89.3    | 57               | 10.7    |
| South Carolina       | 45                   | 2,196                   | 2,018               | 91.9    | 178              | 8.1     |
| South Dakota         | 9                    | 178                     | 163                 | 91.6    | 15               | 8.4     |
| Tennessee            | 51                   | 2,657                   | 2,111               | 79.5    | 546              | 20.5    |
| Texas                | 128                  | 8,069                   | 7,030               | 87.1    | 1,039            | 12.9    |
| Utah                 | 12                   | 417                     | 334                 | 80.1    | 83               | 19.9    |
| Vermont              | 1                    | 101                     | 64                  | 63.4    | 37               | 36.6    |
| Virgin Islands       | 2                    | 37                      | 37                  | 100.0   | 0                | 0.0     |
| Virginia             | 55                   | 3,185                   | 2,681               | 84.2    | 504              | 15.8    |
| Washington           | 19                   | 1,620                   | 1,166               | 72.0    | 454              | 28.0    |
| West Virginia        | 14                   | 656                     | 523                 | 79.7    | 133              | 20.3    |
| Wisconsin            | 33                   | 1,486                   | 1,128               | 75.9    | 358              | 24.1    |
| Wyoming              | 1                    | 32                      | 27                  | 84.4    | 5                | 15.6    |
| American Samoa       | 1                    | 20                      | 20                  | 100.0   | 0                | 0.0     |
| Guam                 | 1                    | 52                      | 52                  | 100.0   | 0                | 0.0     |
| Mariana Islands      | 1                    | 18                      | 18                  | 100.0   | 0                | 0.0     |

NOTE: Percents may not add to total because of rounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 26**  
**Patients completing a self-dialysis training course during the calendar year, by State: 1989**

| State                | Facilities reporting | Total patients | Hemo-dialysis | IPD <sup>1</sup> | CAPD <sup>2</sup> | CCPD <sup>3</sup> |
|----------------------|----------------------|----------------|---------------|------------------|-------------------|-------------------|
| Total                | 875                  | 11,032         | 800           | 138              | 8,529             | 1,565             |
| Alabama              | 16                   | 141            | 8             | 0                | 98                | 35                |
| Alaska               | 1                    | 1              | 1             | 0                | 0                 | 0                 |
| Arizona              | 20                   | 195            | 19            | 0                | 140               | 36                |
| Arkansas             | 14                   | 126            | 1             | 0                | 99                | 26                |
| California           | 90                   | 775            | 33            | 0                | 628               | 114               |
| Colorado             | 10                   | 121            | 6             | 1                | 97                | 17                |
| Connecticut          | 15                   | 241            | 1             | 0                | 226               | 14                |
| Delaware             | 1                    | 59             | 3             | 0                | 52                | 4                 |
| District of Columbia | 7                    | 68             | 10            | 0                | 53                | 5                 |
| Florida              | 59                   | 439            | 18            | 2                | 296               | 123               |
| Georgia              | 36                   | 374            | 56            | 0                | 262               | 56                |
| Hawaii               | 2                    | 41             | 8             | 0                | 30                | 3                 |
| Idaho                | 2                    | 35             | 3             | 0                | 26                | 6                 |
| Illinois             | 33                   | 330            | 16            | 0                | 286               | 28                |
| Indiana              | 17                   | 247            | 6             | 0                | 227               | 14                |
| Iowa                 | 10                   | 114            | 6             | 0                | 88                | 20                |
| Kansas               | 8                    | 131            | 5             | 0                | 123               | 3                 |
| Kentucky             | 14                   | 161            | 11            | 8                | 129               | 13                |
| Louisiana            | 17                   | 183            | 1             | 0                | 159               | 23                |
| Maine                | 3                    | 33             | 5             | 0                | 15                | 13                |
| Maryland             | 21                   | 202            | 14            | 12               | 148               | 28                |
| Massachusetts        | 20                   | 221            | 4             | 3                | 179               | 35                |
| Michigan             | 31                   | 718            | 47            | 19               | 620               | 32                |
| Minnesota            | 8                    | 127            | 25            | 0                | 90                | 12                |
| Mississippi          | 8                    | 167            | 38            | 0                | 109               | 20                |
| Missouri             | 24                   | 309            | 18            | 14               | 233               | 44                |
| Montana              | 4                    | 40             | 10            | 0                | 28                | 2                 |
| Nebraska             | 4                    | 118            | 3             | 0                | 113               | 2                 |
| Nevada               | 3                    | 73             | 25            | 0                | 41                | 7                 |
| New Hampshire        | 2                    | 27             | 0             | 0                | 23                | 4                 |
| New Jersey           | 18                   | 461            | 31            | 15               | 330               | 85                |
| New Mexico           | 6                    | 64             | 1             | 0                | 60                | 3                 |
| New York             | 57                   | 830            | 80            | 0                | 638               | 112               |
| North Carolina       | 20                   | 511            | 11            | 17               | 346               | 137               |
| North Dakota         | 5                    | 30             | 1             | 0                | 24                | 5                 |
| Ohio                 | 24                   | 552            | 8             | 3                | 486               | 55                |
| Oklahoma             | 11                   | 197            | 4             | 19               | 163               | 11                |
| Oregon               | 8                    | 193            | 35            | 0                | 137               | 21                |
| Pennsylvania         | 56                   | 529            | 7             | 3                | 394               | 125               |
| Puerto Rico          | 5                    | 113            | 14            | 2                | 91                | 6                 |
| Rhode Island         | 3                    | 39             | 0             | 1                | 36                | 2                 |
| South Carolina       | 8                    | 77             | 14            | 0                | 58                | 5                 |
| South Dakota         | 2                    | 15             | 0             | 0                | 11                | 4                 |
| Tennessee            | 18                   | 336            | 44            | 8                | 223               | 61                |
| Texas                | 58                   | 476            | 26            | 4                | 331               | 115               |
| Utah                 | 6                    | 42             | 6             | 0                | 33                | 3                 |
| Vermont              | 1                    | 8              | 2             | 0                | 6                 | 0                 |
| Virgin Islands       | 0                    | 0              | 0             | 0                | 0                 | 0                 |
| Virginia             | 26                   | 272            | 24            | 1                | 217               | 30                |
| Washington           | 10                   | 143            | 78            | 5                | 54                | 6                 |
| West Virginia        | 9                    | 100            | 5             | 0                | 81                | 14                |
| Wisconsin            | 23                   | 224            | 8             | 1                | 189               | 26                |
| Wyoming              | 1                    | 3              | 0             | 0                | 3                 | 0                 |
| American Samoa       | 0                    | 0              | 0             | 0                | 0                 | 0                 |
| Guam                 | 0                    | 0              | 0             | 0                | 0                 | 0                 |
| Mariana Islands      | 0                    | 0              | 0             | 0                | 0                 | 0                 |

<sup>1</sup>Intermittent peritoneal dialysis.

<sup>2</sup>Continuous ambulatory peritoneal dialysis.

<sup>3</sup>Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 27**  
**Outpatient dialysis treatments given during the calendar year, by State: 1989**

| State                | Facilities reporting | Total <sup>1</sup> treatments | Hemodialysis | IPD <sup>2</sup> |
|----------------------|----------------------|-------------------------------|--------------|------------------|
| Total                | 1,867                | 13,100,878                    | 13,005,848   | 95,030           |
| Alabama              | 35                   | 297,077                       | 296,815      | 262              |
| Alaska               | 2                    | 7,449                         | 7,449        | 0                |
| Arizona              | 37                   | 187,008                       | 187,008      | 0                |
| Arkansas             | 30                   | 108,812                       | 108,196      | 616              |
| California           | 209                  | 1,586,963                     | 1,586,685    | 278              |
| Colorado             | 16                   | 104,466                       | 104,427      | 39               |
| Connecticut          | 19                   | 154,514                       | 154,120      | 394              |
| Delaware             | 7                    | 37,518                        | 37,518       | 0                |
| District of Columbia | 19                   | 120,135                       | 120,124      | 11               |
| Florida              | 136                  | 748,193                       | 747,700      | 493              |
| Georgia              | 75                   | 424,840                       | 422,041      | 2,799            |
| Hawaii               | 12                   | 95,451                        | 95,451       | 0                |
| Idaho                | 7                    | 21,673                        | 21,673       | 0                |
| Illinois             | 75                   | 635,826                       | 615,964      | 19,862           |
| Indiana              | 33                   | 211,159                       | 211,072      | 87               |
| Iowa                 | 12                   | 79,334                        | 79,334       | 0                |
| Kansas               | 15                   | 82,985                        | 77,155       | 5,830            |
| Kentucky             | 21                   | 122,610                       | 122,264      | 346              |
| Louisiana            | 62                   | 331,755                       | 331,734      | 21               |
| Maine                | 6                    | 34,017                        | 34,017       | 0                |
| Maryland             | 42                   | 273,440                       | 273,056      | 384              |
| Massachusetts        | 30                   | 295,062                       | 294,487      | 575              |
| Michigan             | 43                   | 388,780                       | 375,564      | 13,216           |
| Minnesota            | 26                   | 155,759                       | 155,341      | 418              |
| Mississippi          | 29                   | 191,351                       | 191,187      | 164              |
| Missouri             | 44                   | 236,020                       | 233,812      | 2,208            |
| Montana              | 6                    | 19,932                        | 19,661       | 271              |
| Nebraska             | 11                   | 30,286                        | 30,055       | 231              |
| Nevada               | 5                    | 41,495                        | 41,415       | 80               |
| New Hampshire        | 5                    | 31,294                        | 31,294       | 0                |
| New Jersey           | 34                   | 442,451                       | 434,507      | 7,944            |
| New Mexico           | 16                   | 79,043                        | 79,043       | 0                |
| New York             | 111                  | 1,090,778                     | 1,078,385    | 12,393           |
| North Carolina       | 54                   | 381,644                       | 381,617      | 27               |
| North Dakota         | 7                    | 25,677                        | 25,677       | 0                |
| Ohio                 | 48                   | 451,961                       | 450,760      | 1,201            |
| Oklahoma             | 27                   | 99,517                        | 98,606       | 911              |
| Oregon               | 11                   | 76,043                        | 75,999       | 44               |
| Pennsylvania         | 94                   | 714,685                       | 707,820      | 6,865            |
| Puerto Rico          | 17                   | 207,753                       | 206,546      | 1,207            |
| Rhode Island         | 6                    | 63,990                        | 63,985       | 5                |
| South Carolina       | 45                   | 275,436                       | 275,071      | 365              |
| South Dakota         | 9                    | 22,301                        | 22,301       | 0                |
| Tennessee            | 51                   | 278,769                       | 276,460      | 2,309            |
| Texas                | 128                  | 966,875                       | 962,447      | 4,428            |
| Utah                 | 12                   | 47,363                        | 47,363       | 0                |
| Vermont              | 1                    | 8,865                         | 8,865        | 0                |
| Virgin Islands       | 2                    | 4,724                         | 4,446        | 278              |
| Virginia             | 55                   | 388,503                       | 385,733      | 2,770            |
| Washington           | 19                   | 163,781                       | 161,557      | 2,224            |
| West Virginia        | 14                   | 82,421                        | 82,071       | 350              |
| Wisconsin            | 33                   | 158,034                       | 154,910      | 3,124            |
| Wyoming              | 1                    | 3,408                         | 3,408        | 0                |
| American Samoa       | 1                    | 2,375                         | 2,375        | 0                |
| Guam                 | 1                    | 6,771                         | 6,771        | 0                |
| Mariana Islands      | 1                    | 2,506                         | 2,506        | 0                |

<sup>1</sup>Does not include training treatments.

<sup>2</sup>Intermittent peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 28**  
**Dialysis training treatments given during the calendar year, by State: 1989**

| State                | Facilities reporting | Total training treatments | Hemodialysis | IPD <sup>1</sup> | CAPD <sup>2</sup> | CCPD <sup>3</sup> |
|----------------------|----------------------|---------------------------|--------------|------------------|-------------------|-------------------|
| Total                | 1,867                | 164,793                   | 33,958       | 1,630            | 116,532           | 12,673            |
| Alabama              | 35                   | 6,354                     | 4,796        | 0                | 1,128             | 430               |
| Alaska               | 2                    | 18                        | 18           | 0                | 0                 | 0                 |
| Arizona              | 37                   | 2,190                     | 745          | 0                | 1,224             | 221               |
| Arkansas             | 30                   | 1,098                     | 79           | 0                | 838               | 181               |
| California           | 209                  | 8,676                     | 1,560        | 0                | 6,175             | 941               |
| Colorado             | 16                   | 1,095                     | 163          | 7                | 850               | 75                |
| Connecticut          | 19                   | 4,597                     | 21           | 0                | 4,365             | 211               |
| Delaware             | 7                    | 936                       | 40           | 0                | 832               | 64                |
| District of Columbia | 19                   | 770                       | 198          | 0                | 535               | 37                |
| Florida              | 136                  | 3,612                     | 334          | 6                | 2,409             | 863               |
| Georgia              | 75                   | 2,756                     | 425          | 0                | 1,925             | 406               |
| Hawaii               | 12                   | 536                       | 92           | 0                | 395               | 49                |
| Idaho                | 7                    | 189                       | 60           | 0                | 99                | 30                |
| Illinois             | 75                   | 5,587                     | 738          | 0                | 4,612             | 237               |
| Indiana              | 33                   | 2,492                     | 311          | 0                | 2,085             | 96                |
| Iowa                 | 12                   | 1,170                     | 218          | 0                | 760               | 192               |
| Kansas               | 15                   | 16,392                    | 91           | 0                | 16,287            | 14                |
| Kentucky             | 21                   | 1,336                     | 260          | 48               | 922               | 106               |
| Louisiana            | 62                   | 1,225                     | 82           | 0                | 1,008             | 135               |
| Maine                | 6                    | 303                       | 80           | 0                | 111               | 112               |
| Maryland             | 42                   | 2,198                     | 533          | 203              | 1,255             | 207               |
| Massachusetts        | 30                   | 20,531                    | 105          | 44               | 20,134            | 248               |
| Michigan             | 43                   | 5,592                     | 1,174        | 132              | 4,083             | 203               |
| Minnesota            | 26                   | 903                       | 222          | 0                | 575               | 106               |
| Mississippi          | 29                   | 4,008                     | 708          | 0                | 2,689             | 611               |
| Missouri             | 44                   | 5,017                     | 3,243        | 111              | 1,323             | 340               |
| Montana              | 6                    | 518                       | 179          | 0                | 311               | 28                |
| Nebraska             | 11                   | 713                       | 70           | 0                | 607               | 36                |
| Nevada               | 5                    | 2,524                     | 1,875        | 0                | 562               | 87                |
| New Hampshire        | 5                    | 1,222                     | 0            | 0                | 1,209             | 13                |
| New Jersey           | 34                   | 4,918                     | 902          | 464              | 2,746             | 806               |
| New Mexico           | 16                   | 505                       | 49           | 0                | 427               | 29                |
| New York             | 111                  | 14,212                    | 3,109        | 81               | 9,898             | 1,124             |
| North Carolina       | 54                   | 4,009                     | 365          | 115              | 2,510             | 1,019             |
| North Dakota         | 7                    | 206                       | 12           | 0                | 161               | 33                |
| Ohio                 | 48                   | 5,089                     | 259          | 11               | 4,425             | 394               |
| Oklahoma             | 27                   | 1,585                     | 130          | 211              | 1,178             | 66                |
| Oregon               | 11                   | 1,804                     | 551          | 0                | 1,192             | 61                |
| Pennsylvania         | 94                   | 3,855                     | 211          | 20               | 2,941             | 683               |
| Puerto Rico          | 17                   | 1,347                     | 583          | 10               | 699               | 55                |
| Rhode Island         | 6                    | 359                       | 0            | 2                | 340               | 17                |
| South Carolina       | 45                   | 2,561                     | 246          | 0                | 2,277             | 38                |
| South Dakota         | 9                    | 76                        | 0            | 0                | 61                | 15                |
| Tennessee            | 51                   | 3,073                     | 1,157        | 28               | 1,493             | 395               |
| Texas                | 128                  | 4,996                     | 1,061        | 76               | 2,844             | 1,015             |
| Utah                 | 12                   | 325                       | 54           | 0                | 253               | 18                |
| Vermont              | 1                    | 103                       | 54           | 0                | 49                | 0                 |
| Virgin Islands       | 2                    | 0                         | 0            | 0                | 0                 | 0                 |
| Virginia             | 55                   | 2,526                     | 683          | 8                | 1,572             | 263               |
| Washington           | 19                   | 6,450                     | 5,859        | 44               | 505               | 42                |
| West Virginia        | 14                   | 713                       | 127          | 0                | 486               | 100               |
| Wisconsin            | 33                   | 1,510                     | 126          | 9                | 1,154             | 221               |
| Wyoming              | 1                    | 13                        | 0            | 0                | 13                | 0                 |
| American Samoa       | 1                    | 0                         | 0            | 0                | 0                 | 0                 |
| Guam                 | 1                    | 0                         | 0            | 0                | 0                 | 0                 |
| Mariana Islands      | 1                    | 0                         | 0            | 0                | 0                 | 0                 |

<sup>1</sup>Intermittent peritoneal dialysis.

<sup>2</sup>Continuous ambulatory peritoneal dialysis.

<sup>3</sup>Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 29**  
**Kidney transplant activity during the calendar year: 1989**

| Category                                   | Number |
|--|--------|
| Transplants performed at center            | 8,899  |
| Living-related donor                       | 1,823  |
| Living-unrelated donor                     | 70     |
| Cadaveric donor                            | 7,006  |
| Patients awaiting transplant               | 14,687 |
| Dialysis                                   | 13,823 |
| Nondialysis                                | 864    |
| Patients who received transplant at center | 8,885  |
| Medicare status                            | 8,885  |
| Medicare                                   | 7,619  |
| Medicare pending                           | 492    |
| Non-Medicare                               |        |
| U.S. resident                              | 632    |
| Other                                      | 142    |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 30**  
**Disposition of cadaveric kidneys, by source: 1989**

| Source   | Total | Disposition of cadaveric kidneys |                        |                        |                   |
|--|-------|----------------------------------|------------------------|------------------------|-------------------|
|  |       | Transplanted at center           | Sent to another center | Sent to foreign center | Nonviable kidneys |
| Total  | 9,924 | 7,025                            | 2,492                  | 16                     | 391               |
| Harvested at center                                      | 2,440 | 1,158                            | 1,146                  | 4                      | 132               |
| Obtained from other transplant hospital                  | 789   | 634                              | 137                    | 1                      | 17                |
| Obtained from independent organ procurement organization | 3,647 | 3,351                            | 239                    | 3                      | 54                |
| Obtained from non-transplant hospital                    | 3,048 | 1,882                            | 970                    | 8                      | 188               |
| Non-viable kidneys                                       | 391   | —                                | —                      | —                      | —                 |
| Used for research  | 135   | —                                | —                      | —                      | —                 |
| Discarded  | 256   | —                                | —                      | —                      | —                 |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 31**  
**Kidney transplant center patient eligibility status, by State: 1989**

| State                | Centers reporting | Total transplant patients | Currently enrolled in Medicare | Medicare application pending | Non-Medicare  |       |
|----------------------|-------------------|---------------------------|--------------------------------|------------------------------|---------------|-------|
|                      |                   |                           |                                |                              | U.S. resident | Other |
| Total                | 217               | 8,885                     | 7,619                          | 492                          | 632           | 142   |
| Alabama              | 2                 | 245                       | 236                            | 4                            | 4             | 1     |
| Arizona              | 4                 | 147                       | 106                            | 5                            | 35            | 1     |
| Arkansas             | 3                 | 60                        | 57                             | 1                            | 1             | 1     |
| California           | 22                | 1,154                     | 903                            | 119                          | 105           | 27    |
| Colorado             | 3                 | 129                       | 113                            | 10                           | 6             | 0     |
| Connecticut          | 2                 | 101                       | 75                             | 10                           | 16            | 0     |
| District of Columbia | 5                 | 179                       | 152                            | 7                            | 3             | 17    |
| Florida              | 6                 | 430                       | 410                            | 12                           | 6             | 2     |
| Georgia              | 6                 | 243                       | 210                            | 27                           | 0             | 6     |
| Hawaii               | 1                 | 32                        | 31                             | 0                            | 0             | 1     |
| Illinois             | 8                 | 321                       | 291                            | 4                            | 24            | 2     |
| Indiana              | 2                 | 153                       | 140                            | 7                            | 6             | 0     |
| Iowa                 | 3                 | 84                        | 77                             | 6                            | 1             | 0     |
| Kansas               | 2                 | 62                        | 60                             | 2                            | 0             | 0     |
| Kentucky             | 3                 | 104                       | 100                            | 3                            | 1             | 0     |
| Louisiana            | 7                 | 120                       | 106                            | 6                            | 7             | 1     |
| Maine                | 1                 | 41                        | 35                             | 0                            | 6             | 0     |
| Maryland             | 3                 | 91                        | 86                             | 0                            | 4             | 1     |
| Massachusetts        | 10                | 358                       | 263                            | 21                           | 68            | 6     |
| Michigan             | 9                 | 311                       | 284                            | 12                           | 13            | 2     |
| Minnesota            | 4                 | 298                       | 245                            | 20                           | 31            | 2     |
| Mississippi          | 1                 | 14                        | 14                             | 0                            | 0             | 0     |
| Missouri             | 9                 | 248                       | 238                            | 6                            | 3             | 1     |
| Nebraska             | 3                 | 61                        | 55                             | 3                            | 1             | 2     |
| Nevada               | 1                 | 1                         | 1                              | 0                            | 0             | 0     |
| New Jersey           | 3                 | 93                        | 83                             | 4                            | 2             | 4     |
| New Mexico           | 2                 | 50                        | 45                             | 4                            | 1             | 0     |
| New York             | 15                | 529                       | 444                            | 14                           | 58            | 13    |
| North Carolina       | 5                 | 180                       | 174                            | 3                            | 3             | 0     |
| North Dakota         | 2                 | 9                         | 9                              | 0                            | 0             | 0     |
| Ohio                 | 12                | 430                       | 382                            | 29                           | 6             | 13    |
| Oklahoma             | 6                 | 99                        | 84                             | 13                           | 2             | 0     |
| Oregon               | 1                 | 109                       | 98                             | 8                            | 3             | 0     |
| Pennsylvania         | 10                | 630                       | 440                            | 49                           | 130           | 11    |
| Puerto Rico          | 1                 | 34                        | 34                             | 0                            | 0             | 0     |
| South Carolina       | 1                 | 66                        | 66                             | 0                            | 0             | 0     |
| Tennessee            | 7                 | 233                       | 211                            | 12                           | 9             | 1     |
| Texas                | 16                | 648                       | 535                            | 33                           | 56            | 24    |
| Utah                 | 2                 | 102                       | 83                             | 17                           | 1             | 1     |
| Vermont              | 1                 | 15                        | 14                             | 1                            | 0             | 0     |
| Virginia             | 3                 | 143                       | 136                            | 1                            | 5             | 1     |
| Washington           | 5                 | 197                       | 185                            | 7                            | 5             | 0     |
| West Virginia        | 2                 | 44                        | 35                             | 6                            | 3             | 0     |
| Wisconsin            | 3                 | 287                       | 273                            | 6                            | 7             | 1     |

NOTE: The following States have no Medicare-approved transplant centers: Alaska, Delaware, Idaho, Montana, New Hampshire, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, Virgin Islands, and Manana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 32**  
**Number of kidney transplants performed and type of donor, by State: 1989**

| State                | Centers reporting | Total patients | Total transplants | Living-related |         | Living-unrelated |         | Cadaveric |         |
|----------------------|-------------------|----------------|-------------------|----------------|---------|------------------|---------|-----------|---------|
|                      |                   |                |                   | Total          | Percent | Total            | Percent | Total     | Percent |
| Total                | 217               | 8,885          | 8,899             | 1,823          | 20.5    | 70               | 0.8     | 7,006     | 78.7    |
| Alabama              | 2                 | 245            | 245               | 61             | 24.9    | 0                | 0.0     | 184       | 75.1    |
| Arizona              | 4                 | 147            | 147               | 27             | 18.4    | 0                | 0.0     | 120       | 81.6    |
| Arkansas             | 3                 | 60             | 61                | 21             | 34.4    | 0                | 0.0     | 40        | 65.6    |
| California           | 22                | 1,154          | 1,156             | 162            | 14.0    | 4                | 0.3     | 990       | 85.6    |
| Colorado             | 3                 | 129            | 129               | 10             | 7.8     | 0                | 0.0     | 119       | 92.2    |
| Connecticut          | 2                 | 101            | 101               | 20             | 19.8    | 0                | 0.0     | 81        | 80.2    |
| District of Columbia | 5                 | 179            | 179               | 29             | 16.2    | 3                | 1.7     | 147       | 82.1    |
| Florida              | 6                 | 430            | 430               | 84             | 19.5    | 2                | 0.5     | 344       | 80.0    |
| Georgia              | 6                 | 243            | 243               | 69             | 28.4    | 2                | 0.8     | 172       | 70.8    |
| Hawaii               | 1                 | 32             | 32                | 7              | 21.9    | 0                | 0.0     | 25        | 78.1    |
| Illinois             | 8                 | 321            | 322               | 61             | 18.9    | 0                | 0.0     | 261       | 81.1    |
| Indiana              | 2                 | 153            | 153               | 37             | 24.2    | 3                | 2.0     | 113       | 73.9    |
| Iowa                 | 3                 | 84             | 84                | 13             | 15.5    | 0                | 0.0     | 71        | 84.5    |
| Kansas               | 2                 | 62             | 62                | 8              | 12.9    | 2                | 3.2     | 52        | 83.9    |
| Kentucky             | 3                 | 104            | 104               | 29             | 27.9    | 0                | 0.0     | 75        | 72.1    |
| Louisiana            | 7                 | 120            | 120               | 26             | 21.7    | 0                | 0.0     | 94        | 78.3    |
| Maine                | 1                 | 41             | 41                | 11             | 26.8    | 0                | 0.0     | 30        | 73.2    |
| Maryland             | 3                 | 91             | 91                | 15             | 16.5    | 0                | 0.0     | 76        | 83.5    |
| Massachusetts        | 10                | 358            | 358               | 91             | 25.4    | 2                | 0.6     | 265       | 74.0    |
| Michigan             | 9                 | 311            | 313               | 78             | 24.9    | 3                | 1.0     | 232       | 74.1    |
| Minnesota            | 4                 | 298            | 301               | 101            | 33.6    | 6                | 2.0     | 194       | 64.5    |
| Mississippi          | 1                 | 14             | 14                | 1              | 7.1     | 0                | 0.0     | 13        | 92.9    |
| Missouri             | 9                 | 248            | 248               | 61             | 24.6    | 6                | 2.4     | 181       | 73.0    |
| Nebraska             | 3                 | 61             | 61                | 5              | 8.2     | 0                | 0.0     | 56        | 91.8    |
| Nevada               | 1                 | 1              | 1                 | 0              | 0.0     | 0                | 0.0     | 1         | 100.0   |
| New Jersey           | 3                 | 93             | 93                | 5              | 5.4     | 0                | 0.0     | 88        | 94.6    |
| New Mexico           | 2                 | 50             | 50                | 2              | 4.0     | 0                | 0.0     | 48        | 96.0    |
| New York             | 15                | 529            | 529               | 116            | 21.9    | 3                | 0.6     | 410       | 77.5    |
| North Carolina       | 5                 | 180            | 181               | 45             | 24.9    | 1                | 0.6     | 135       | 74.6    |
| North Dakota         | 2                 | 9              | 9                 | 7              | 77.8    | 1                | 11.1    | 1         | 11.1    |
| Ohio                 | 12                | 430            | 430               | 97             | 22.6    | 2                | 0.5     | 331       | 77.0    |
| Oklahoma             | 6                 | 99             | 99                | 22             | 22.2    | 2                | 2.0     | 75        | 75.8    |
| Oregon               | 1                 | 109            | 109               | 22             | 20.2    | 0                | 0.0     | 87        | 79.8    |
| Pennsylvania         | 10                | 630            | 630               | 90             | 14.3    | 5                | 0.8     | 535       | 84.9    |
| Puerto Rico          | 1                 | 34             | 34                | 23             | 67.6    | 0                | 0.0     | 11        | 32.4    |
| South Carolina       | 1                 | 66             | 66                | 13             | 19.7    | 0                | 0.0     | 53        | 80.3    |
| Tennessee            | 7                 | 233            | 233               | 69             | 29.6    | 1                | 0.4     | 163       | 70.0    |
| Texas                | 16                | 648            | 648               | 105            | 16.2    | 12               | 1.9     | 531       | 81.9    |
| Utah                 | 2                 | 102            | 102               | 30             | 29.4    | 0                | 0.0     | 72        | 70.6    |
| Vermont              | 1                 | 15             | 15                | 3              | 20.0    | 0                | 0.0     | 12        | 80.0    |
| Virginia             | 3                 | 143            | 143               | 28             | 19.6    | 3                | 2.1     | 112       | 78.3    |
| Washington           | 5                 | 197            | 197               | 51             | 25.9    | 0                | 0.0     | 146       | 74.1    |
| West Virginia        | 2                 | 44             | 44                | 11             | 25.0    | 0                | 0.0     | 33        | 75.0    |
| Wisconsin            | 3                 | 287            | 291               | 57             | 19.6    | 7                | 2.4     | 227       | 78.0    |

NOTE: Percents may not add to total because of rounding. The following States have no Medicare-approved kidney transplant centers: Alaska, Delaware, Idaho, Montana, New Hampshire, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, Virgin Islands and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

**Table 33**  
**Distribution of kidney transplants and number of transplants, by State: 1989**

| State                | Centers reporting | Total transplants | 0-15  |         | 16-50 |         | 51-100 |         | 101-200 |         | 201 or more |         |
|----------------------|-------------------|-------------------|-------|---------|-------|---------|--------|---------|---------|---------|-------------|---------|
|                      |                   |                   | Total | Percent | Total | Percent | Total  | Percent | Total   | Percent | Total       | Percent |
| Total                | 217               | 8,899             | 63    | 29.0    | 96    | 44.2    | 40     | 18.4    | 15      | 6.9     | 3           | 1.4     |
| Alabama              | 2                 | 245               | 1     | 50.0    | 0     | 0.0     | 0      | 0.0     | 0       | 0.0     | 1           | 50.0    |
| Arizona              | 4                 | 147               | 1     | 25.0    | 2     | 50.0    | 1      | 25.0    | 0       | 0.0     | 0           | 0.0     |
| Arkansas             | 3                 | 61                | 1     | 33.3    | 2     | 66.7    | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| California           | 22                | 1,156             | 4     | 18.2    | 13    | 59.1    | 1      | 4.5     | 3       | 13.6    | 1           | 4.5     |
| Colorado             | 3                 | 129               | 0     | 0.0     | 2     | 66.7    | 1      | 33.3    | 0       | 0.0     | 0           | 0.0     |
| Connecticut          | 2                 | 101               | 0     | 0.0     | 1     | 50.0    | 1      | 50.0    | 0       | 0.0     | 0           | 0.0     |
| District of Columbia | 5                 | 179               | 3     | 60.0    | 1     | 20.0    | 0      | 0.0     | 1       | 20.0    | 0           | 0.0     |
| Florida              | 6                 | 430               | 2     | 33.3    | 0     | 0.0     | 2      | 33.3    | 2       | 33.3    | 0           | 0.0     |
| Georgia              | 6                 | 243               | 3     | 50.0    | 0     | 0.0     | 2      | 33.3    | 1       | 16.7    | 0           | 0.0     |
| Hawaii               | 1                 | 32                | 0     | 0.0     | 1     | 100.0   | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Illinois             | 8                 | 322               | 1     | 12.5    | 5     | 62.5    | 2      | 25.0    | 0       | 0.0     | 0           | 0.0     |
| Indiana              | 2                 | 153               | 0     | 0.0     | 1     | 50.0    | 0      | 0.0     | 1       | 50.0    | 0           | 0.0     |
| Iowa                 | 3                 | 84                | 2     | 66.7    | 0     | 0.0     | 1      | 33.3    | 0       | 0.0     | 0           | 0.0     |
| Kansas               | 2                 | 62                | 0     | 0.0     | 2     | 100.0   | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Kentucky             | 3                 | 104               | 1     | 33.3    | 1     | 33.3    | 1      | 33.3    | 0       | 0.0     | 0           | 0.0     |
| Louisiana            | 7                 | 120               | 4     | 57.1    | 3     | 42.9    | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Maine                | 1                 | 41                | 0     | 0.0     | 1     | 100.0   | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Maryland             | 3                 | 91                | 0     | 0.0     | 3     | 100.0   | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Massachusetts        | 10                | 358               | 2     | 20.0    | 5     | 50.0    | 3      | 30.0    | 0       | 0.0     | 0           | 0.0     |
| Michigan             | 9                 | 313               | 3     | 33.3    | 4     | 44.4    | 2      | 22.2    | 0       | 0.0     | 0           | 0.0     |
| Minnesota            | 4                 | 301               | 0     | 0.0     | 2     | 50.0    | 1      | 25.0    | 1       | 25.0    | 0           | 0.0     |
| Mississippi          | 1                 | 14                | 1     | 100.0   | 0     | 0.0     | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Missouri             | 9                 | 248               | 4     | 44.4    | 4     | 44.4    | 1      | 11.1    | 0       | 0.0     | 0           | 0.0     |
| Nebraska             | 3                 | 61                | 2     | 66.7    | 1     | 33.3    | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Nevada               | 1                 | 1                 | 1     | 100.0   | 0     | 0.0     | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| New Jersey           | 3                 | 93                | 0     | 0.0     | 3     | 100.0   | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| New Mexico           | 2                 | 50                | 0     | 0.0     | 2     | 100.0   | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| New York             | 15                | 529               | 4     | 26.7    | 7     | 46.7    | 4      | 26.7    | 0       | 0.0     | 0           | 0.0     |
| North Carolina       | 5                 | 181               | 0     | 0.0     | 4     | 80.0    | 1      | 20.0    | 0       | 0.0     | 0           | 0.0     |
| North Dakota         | 2                 | 9                 | 2     | 100.0   | 0     | 0.0     | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Ohio                 | 12                | 430               | 4     | 33.3    | 6     | 50.0    | 1      | 8.3     | 1       | 8.3     | 0           | 0.0     |
| Oklahoma             | 6                 | 99                | 2     | 33.3    | 4     | 66.7    | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Oregon               | 1                 | 109               | 0     | 0.0     | 0     | 0.0     | 0      | 0.0     | 1       | 100.0   | 0           | 0.0     |
| Pennsylvania         | 10                | 630               | 2     | 20.0    | 3     | 30.0    | 3      | 30.0    | 1       | 10.0    | 1           | 10.0    |
| Puerto Rico          | 1                 | 34                | 0     | 0.0     | 1     | 100.0   | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| South Carolina       | 1                 | 66                | 0     | 0.0     | 0     | 0.0     | 1      | 100.0   | 0       | 0.0     | 0           | 0.0     |
| Tennessee            | 7                 | 233               | 4     | 57.1    | 1     | 14.3    | 1      | 14.3    | 1       | 14.3    | 0           | 0.0     |
| Texas                | 16                | 648               | 4     | 25.0    | 6     | 37.5    | 5      | 31.3    | 1       | 6.3     | 0           | 0.0     |
| Utah                 | 2                 | 102               | 0     | 0.0     | 1     | 50.0    | 1      | 50.0    | 0       | 0.0     | 0           | 0.0     |
| Vermont              | 1                 | 15                | 1     | 100.0   | 0     | 0.0     | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Virginia             | 3                 | 143               | 0     | 0.0     | 2     | 66.7    | 1      | 33.3    | 0       | 0.0     | 0           | 0.0     |
| Washington           | 5                 | 197               | 2     | 40.0    | 1     | 20.0    | 2      | 40.0    | 0       | 0.0     | 0           | 0.0     |
| West Virginia        | 2                 | 44                | 1     | 50.0    | 1     | 50.0    | 0      | 0.0     | 0       | 0.0     | 0           | 0.0     |
| Wisconsin            | 3                 | 291               | 1     | 33.3    | 0     | 0.0     | 1      | 33.3    | 1       | 33.3    | 0           | 0.0     |

NOTE: Percentages may not add to 100% due to rounding. The following States have no Medicare-approved kidney transplant centers: Alaska, Delaware, Idaho, Montana, New Hampshire, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, Virgin Islands, and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1989.

## Department of Veterans Affairs dialysis statistics

As of December 31, 1989, there were 57 Department of Veterans Affairs (DVA) dialysis centers and 25 DVA satellite-type programs providing services to dialysis patients. The statistics displayed in Table 34 include 674 patients (all of whom were on chronic dialysis) who were dialyzing in 13 Medicare-approved Department of Veterans Affairs facilities. Data on the number of continuous ambulatory peritoneal dialysis (CAPD) patients are not captured as a separate category by the DVA.

The patient counts in Table 34 reflect counts taken on December 31 each year. The total number of patients receiving dialysis on a contract/fee-basis in non-DVA units

at DVA expense decreased 13.4 percent in 1989 (from 590 in 1988 to 511 in 1989). The decrease from 3,722 patients in 1988 to 3,389 patients in 1989 reflects a net decline of 9.0 percent. The number of patients dialyzing at home at the end of each year declined at a rate of 16.3 percent (from 860 patients in 1988 to 720 patients in 1989). The number of patients receiving assisted hemodialysis in DVA dialysis centers decreased from 1,602 in 1988 to 1,564 in 1989—a decrease of 2.4 percent. The number of patients receiving acute dialysis services from the DVA decreased from 186 in 1988 to 123 in 1989—a decrease of 33.9 percent.

**Table 34**  
**Number of patients for Department of Veterans Affairs dialysis facilities, by type of dialysis: 1988-89**

| Type of dialysis             | December 31, 1988 |                          |                                    |              | December 31, 1989 |                          |                                    |              |
|------------------------------|-------------------|--------------------------|------------------------------------|--------------|-------------------|--------------------------|------------------------------------|--------------|
|                              | All patients      | Dialysis center patients | Satellite dialysis center patients | Contract fee | All patients      | Dialysis center patients | Satellite dialysis center patients | Contract fee |
| All modalities               | 3,722             | 2,757                    | 375                                | 590          | 3,389             | 2,553                    | 325                                | 511          |
| <b>Acute</b>                 | <b>186</b>        |                          |                                    |              | <b>123</b>        |                          |                                    |              |
| Hemodialysis                 | 177               | 146                      | 31                                 | —            | 120               | 94                       | 26                                 | —            |
| Peritoneal dialysis          | 9                 | 9                        | 0                                  | —            | 3                 | 3                        | 0                                  | —            |
| <b>Staff-assisted</b>        | <b>1,934</b>      |                          |                                    |              | <b>1,944</b>      |                          |                                    |              |
| Hemodialysis                 | 1,889             | 1,602                    | 287                                | —            | 1,828             | 1,564                    | 264                                | —            |
| Peritoneal dialysis          | 45                | 41                       | 4                                  | —            | 116               | 103                      | 13                                 | —            |
| <b>Limited</b>               | <b>121</b>        |                          |                                    |              | <b>73</b>         |                          |                                    |              |
| Hemodialysis                 | 121               | 121                      | 0                                  | —            | 69                | 69                       | 0                                  | —            |
| Peritoneal dialysis          | 0                 | 0                        | 0                                  | —            | 4                 | 4                        | 0                                  | —            |
| <b>In training</b>           | <b>31</b>         |                          |                                    |              | <b>18</b>         |                          |                                    |              |
| Hemodialysis training        | 21                | 20                       | 1                                  | —            | 9                 | 8                        | 1                                  | —            |
| Peritoneal dialysis training | 10                | 10                       | 0                                  | —            | 9                 | 9                        | 0                                  | —            |
| <b>Home</b>                  | <b>860</b>        |                          |                                    |              | <b>720</b>        |                          |                                    |              |
| Hemodialysis                 | 378               | 365                      | 13                                 | —            | 293               | 285                      | 8                                  | —            |
| Peritoneal dialysis          | 482               | 443                      | 39                                 | —            | 427               | 414                      | 13                                 | —            |
| <b>Contract</b>              | <b>590</b>        |                          |                                    |              | <b>511</b>        |                          |                                    |              |
| Hemodialysis                 | 558               | —                        | —                                  | 558          | 487               | —                        | —                                  | 487          |
| Peritoneal dialysis          | 32                | —                        | —                                  | 32           | 24                | —                        | —                                  | 24           |

SOURCE: Department of Veterans Affairs, Department of Medicine and Surgery; Data from the Division of Clinical Affairs, Medical Service Section, 1988-89.

# Survival analyses

Program experience with respect to both patient and graft survival from onset of renal failure, or from date of kidney transplant, to 5 years subsequent is discussed in this section. This analysis covered the period from January 1, 1985 through December 31, 1988. All Medicare beneficiaries with renal failure occurring on or after January 1, 1985 through December 31, 1988 were included in the analysis of dialysis survival. The transplant survival analysis included Medicare beneficiaries whose transplants occurred on or after January 1, 1985 through December 31, 1988. The total number of persons included in the computation of dialysis patient survival was 121,559. The total number of transplants included in the computation of transplant survival was 31,778 (24,974 cadaveric donor transplants and 6,804 living-related donor transplants). Patient and graft survival were tracked through March 31, 1990.

## Data

The computation of survival rates for dialysis patients required a date of renal failure onset along with the date of death or the date of transplantation (if the patient was subsequently transplanted). Computation of survival rates for transplant patients required the date of transplantation and the date of death (for patient survival) or the date of graft failure (for graft survival). The date of renal failure onset was defined as the date of first dialysis and was taken from the patient's medical evidence records (HCFA-2728) or the outpatient dialysis records (HCFA-1450). In the absence of these records, the date of renal failure onset was estimated from the entitlement records. The date of death was obtained from the Master Beneficiary Records that are maintained for all Medicare beneficiaries. The date of transplant was obtained from the transplant form (HCFA-2745) or from the inpatient hospital bill (HCFA-1450). The date of transplant failure was either obtained from the transplant follow-up form, calculated based on a record of outpatient dialysis sessions, or based on the date of a subsequent transplant.

Survival rates were calculated using a standard actuarial modified life-table analysis. For dialysis patients, survival was measured beginning 90 days following the date of renal failure onset until death, with right censoring<sup>1</sup> for transplantation or the end of the observation period (March 31, 1990). The 90 day lag in calculation of the start date was included to avoid the potential bias of excluding persons who died during the interval between renal failure and Medicare entitlement. For transplants, patient survival was measured from the date of transplantation until death, with right censoring for the end of the observation period. Graft survival for

transplants was measured from the date of transplantation until graft failure date or date of death, with right censoring for the end of the observation period.

Because it has been found that there are significant age differences among the population subgroups (for example, white persons on dialysis are generally older than black persons on dialysis and persons whose renal failure is due to hypertension are generally older than persons whose renal failure is due to diabetes), the survival rates for each sex, race, and primary diagnostic subgroup were age-adjusted to the age distribution for all persons in each table. For example, survival rates for males and females on dialysis were age-adjusted to the age distribution for all persons on dialysis. Individual survival rates among cadaveric donor transplants were age-adjusted to all cadaveric donor transplants, and individual survival rates among living-related donor transplants were age-adjusted to all living-related donor transplants. Therefore, survival differences among population subgroups due to age differences were largely eliminated.

## Results

The results of the analysis of dialysis patient survival are presented in Table 35. At 1 year from the 90 days offset (following renal failure onset), 78.0 percent of patients were still alive. At 3 years this had decreased to 50.3 percent and at 5 years to 34.5 percent. There were notable differences by age group. The two groups comprised of persons less than 25 years of age (at the time of renal failure) had a combined 1-year survival rate of 94 percent. However, in years 3 through 5, survival was higher for persons 0 to 14 years of age than for persons 15 to 24 years of age. Consequently, by 5 years post renal failure, persons 0 to 14 years of age had a cumulative survival rate of 82.5 percent, compared to 72.2 percent among persons 15 to 24 years of age. The rate of survival decreased for each older age cohort. For those over 75 years of age, the 1-year survival rate, was only 59.9 percent; less than one-quarter (24.9 percent) survived 3 years; and only 11.2 percent survived 5 years on dialysis after renal failure. At the end of 1 year, the survival rate for females was 2.0 percent greater than the rate for males (79.1 percent and 77.1 percent, respectively). At 3 years, females had a cumulative survival rate that was 4.3 percent greater than the survival rate for males (52.6 percent and 48.3 percent, respectively). By the end of the fifth year, the survival rate for female dialysis patients was 3.8 percent greater than the rate for males (36.5 percent and 32.7 percent, respectively). By racial group, the highest survival rates for dialysis patients were found among Asian and black persons. Over the first 4 years, slightly more than 1 percentage point or less separated the survival rates for these two groups. The greatest difference in dialysis

<sup>1</sup>Right censoring is a technique for handling cases in which the person is still alive at the end of the observation period. The life table calculation stops at the right censor date for these persons. However, unlike a withdrawal because of death, there is no increment to the number of deaths.

patient survival rates was found between Asian persons and white persons. The rate for Asian persons exceeded the rate for white persons by 6.9 percent in year 1 (83.3 percent and 76.4 percent, respectively) and by 10.2 percent in year 5 (41.8 percent and 31.6 percent, respectively). Survival rates for white persons were consistently below survival rates for all other racial groups. In terms of the reported cause of renal failure (i.e., the primary diagnosis) in dialysis patients, the lowest survival rates were found among those patients with diabetes. At 1 year, the survival rate for the diabetic group (73.1 percent) was 5.0 percent lower than the next lowest group—those for whom renal failure was attributed to obstructive nephropathy (78.1 percent). By year 5, the survival rate for the diabetic group had decreased to 21.3 percent and was 18.4 percent lower than the next lowest group, which was persons whose renal failure was attributed to hypertension and whose 5-year survival rate was 39.7 percent. The highest survival rate for year 5 was found for those patients with polycystic kidney disease (53.9 percent). Persons whose renal failure was attributed to glomerulonephritis had a 5-year survival rate of 42.5 percent; the 5-year survival rate for those with interstitial nephropathy was 41.3 percent; and for those with obstructive nephropathy the 5-year survival rate was 43.5 percent.

Patient survival rates for persons with cadaver donor transplants and living-related donor transplants are presented in Tables 36 and 37, respectively. Among cadaver donor transplant patients, survival rates were 91.8 percent at 1 year, 84.1 percent at 3 years, and 75.8 percent at 5 years. With the exception of persons ages 0 to 14, the data show that the likelihood of patient survival decreased with advancing age. The 3-year survival rate was 92.4 percent for persons 15 to 25 years of age, falling to 70.4 percent for persons 65 to 74 years of age. The 5-year survival rate for cadaver donor transplant patients was 87.0 percent for persons 0 to 25 years of age, decreasing to 54.6 percent for persons 65 to 74 years of age.

Females had a higher survival rate than did males after a cadaver donor transplant. At year 1, the female survival rate (92.4 percent) exceeded the male survival rate (91.5 percent) by 0.9 percent. By year 5, the female survival rate (78.3 percent) exceeded the male survival rate (74.4 percent) by 3.9 percent.

The 3-year survival rates for cadaver donor transplant patients exceeded 80 percent for all race categories reported. At 5 years, Asian persons experienced the highest survival rate (82.7 percent). The lowest survival rate was experienced by black persons (73.8 percent).

In terms of the reported cause of renal failure for cadaver donor transplants, the lowest survival rates, across the 5 years reported, were found for those patients with diabetes. At year 1, the survival rate for the diabetic group (87.9 percent) was 3.1 percent lower than the next lowest group; those for whom renal failure was attributed to obstructive nephropathy (91.0 percent). By year 5, the survival rate for the diabetic group had declined to 61.5 percent, 14.9 percent lower than the next lowest category, the hypertension group, which had a

survival rate of 76.4 percent. The highest 5-year survival rate was experienced by persons whose renal failure was attributed to polycystic kidney disease (85.4 percent).

Eighty-five percent of all cadaver transplants between 1985 and 1988 were first transplants. Patient survival was higher for first transplants than for subsequent transplants at 5 years post transplant (76.4 percent and 72.1 percent, respectively).

The data in Table 37 indicate that, among living-related donor transplant patients, the survival rate for year 1 was 96.5 percent, for year 3 was 92.9 percent, and for year 5 was 87.8 percent. As with cadaver donor recipients, survival for living-related donor transplant patients decreased with age. At year 1, all age groups had survival rates that exceeded 90 percent. At year 3, the survival rate for those people under 45 years of age still exceeded 90 percent, but the rate for those 45 years of age and over dropped below 90 percent. Finally, in year 5, the survival rate for those under 25 years of age continued to be higher than 90 percent (about 94 percent), while the rate for all others dropped below 90 percent. For those persons between 45 and 54 years of age, the rate dropped to 75.1 percent.

The difference in the survival rates for males and females who received a living-related donor transplant was less than 1 percent through year 3 and for year 5. In year 4, the female rate (91.1 percent) was 1.3 percent greater than the male rate (89.8 percent).

Among the races reported, Asian persons consistently had the highest survival rate for the 5 years. At year 5, the survival rate for Asian persons was 94.1 percent, followed by white persons at 88.2 percent, black persons at 85.4 percent, and American Indians at 75.4 percent.

Again, as with cadaver donor transplants, the survival rate for living-related donor transplant patients was generally lower for persons for whom diabetes was found to be the primary cause of renal failure. By year 5, the survival rate for the diabetic group (76.0 percent) was more than 14 percent lower than the rate for the next lower group—the hypertensive group (90.3 percent). Living-related donor transplants as subsequent transplants were fairly unusual, and accounted for only 6 percent of living-related donor transplants. Patient survival at 5 years was lower (81.7 percent) for subsequent living-related donor transplants than for first living-related donor transplants (88.0 percent).

Kidney graft survival rates for cadaveric transplants and living-related donor transplants are presented in Tables 38 and 39, respectively. Among cadaver donor transplants, 75.1 percent of the kidney grafts survived for at least 1 year; 62.0 percent survived 3 years; and 52.0 percent were still functioning at year 5. The age group of less than 15 years of age, which experienced the highest patient survival rate after a cadaver donor transplant (see Table 36), generally experienced the lowest graft survival rates in cadaver donor transplants (68.2 percent in year 1, decreasing to 45.3 percent in year 5). The 65 to 74 years of age group, which experienced the lowest patient survival for cadaver donor transplant, also experienced relatively low graft survival rates for cadaver donor transplants (70.5 percent in year 1 and

48.7 percent in year 5).

Asian persons with a cadaver transplant had the highest 5-year graft survival rate (60.6 percent), followed by white persons (55.2 percent), American Indians (50.8 percent), and black persons (40.6 percent).

The lowest 3-year graft survival rate for cadaver donor transplants was found among those people for whom the primary cause of renal failure was attributed to hypertension (55.9 percent). The highest 3 year survival rates were found for those persons with polycystic kidney disease (66.8 percent) and interstitial nephropathy (66.3 percent). By year 5, the survival rate for the hypertensive group had declined to 45.0 percent, still the lowest survival rate. The highest cadaver donor graft survival rate was found in persons with a primary diagnosis of polycystic kidney disease (62.3 percent), followed by interstitial nephropathy (58.4 percent).

First cadaver transplants had a higher first year graft survival rate than subsequent cadaver transplants (76.6 percent and 65.7 percent, respectively). This 10 percent differential remained constant through the fourth year post transplantation and dropped to a 9.4 percent differential in the fifth year.

Among living-related donor transplants (Table 39), 88.7 percent of the kidney grafts survived to year 1; 80.1 percent survived to year 3; and 72.4 percent survived to year 5. At year 1, the survival rates by age group ranged between 85.5 percent for persons 55 to 64 years of age and 90.3 percent for persons 15 to 24 years of age—a 4.8 percent differential. By year 5, these rates had fallen to between 66.9 percent for persons 45 to 54 years of age and 75.6 percent for persons 35 to 44 years of age, a differential of 8.1 percent.

At year 1, the living-related donor graft survival rates for males and females were essentially equivalent (88.5 percent and 89.0 percent, respectively). At year 5, the graft survival rate for females (73.7 percent) exceeded the rate for males (71.6 percent) by 2 percent.

As with cadaver donor transplants, graft survival for living-related donor transplant was lowest for black persons at 1 year post transplant (83.1 percent). This graft survival rate was 6.3 percent below the next lowest group which was white persons at 89.4 percent. The highest survival rates were found among the Asians (90.7 percent) and American Indians (89.8 percent). By year 5, the graft survival rate for black persons had declined to 56.3 percent. This rate was 18.6 percent below the rate for the next lowest group which, at year 5, was the American Indians (64.9 percent). The highest 5-year survival rate was found for Asian persons (85.1 percent) followed by white persons (74.6 percent).

By primary diagnosis category, the 3- and 5-year graft survival rates for living-related donor transplants were, again, lowest for persons whose renal failure was attributed to hypertension (74.1 percent and 64.2 percent, respectively). The highest 3-year graft survival rates were found for those persons with a primary diagnosis of obstructive nephropathy (86.9 percent) or polycystic kidney disease (86.4 percent). The highest 5-year graft survival rates were found for those persons with obstructive nephropathy (82.4 percent) or polycystic kidney disease (80.1 percent).

The difference in survival rates for the graft in living-related donor transplants between first and subsequent transplants decreased over the 5 years reported. The one year graft survival rate was 5 percent higher for first living-related donor transplants than for subsequent living-related donor transplants (89.0 percent and 84.0 percent, respectively). At five years, 72.6 percent of first living-related donor grafts were functioning, compared to 68.8 percent of subsequent living-related donor grafts.

**Table 35**  
**Dialysis patient survival, by age, sex, race, and primary diagnosis: 1985-88**

| Age, sex, race, and primary disease | Total   | Percent surviving |            |            |            |            |
|-------------------------------------|---------|-------------------|------------|------------|------------|------------|
|                                     |         | 1 year            | 2 years    | 3 years    | 4 years    | 5 years    |
| All persons                         | 121,559 | 78.0 (0.1)        | 62.1 (0.2) | 50.3 (0.2) | 41.3 (0.2) | 34.5 (0.3) |
| <b>Age</b>                          |         |                   |            |            |            |            |
| Under 15 years                      | 1,457   | 93.6 (0.8)        | 88.4 (1.2) | 85.1 (1.7) | 82.5 (2.2) | 82.5 (2.2) |
| 15 - 24 years                       | 4,369   | 94.2 (0.4)        | 89.4 (0.6) | 84.2 (0.9) | 79.3 (1.2) | 72.2 (2.0) |
| 25 - 34 years                       | 10,769  | 89.9 (0.3)        | 79.2 (0.5) | 70.9 (0.6) | 63.9 (0.8) | 57.9 (1.2) |
| 35 - 44 years                       | 14,447  | 88.4 (0.3)        | 76.5 (0.4) | 67.2 (0.5) | 59.1 (0.7) | 52.1 (0.9) |
| 45 - 54 years                       | 17,967  | 85.5 (0.3)        | 71.4 (0.4) | 59.4 (0.5) | 49.5 (0.6) | 42.6 (0.7) |
| 55 - 64 years                       | 28,260  | 78.6 (0.3)        | 61.7 (0.3) | 48.5 (0.3) | 38.2 (0.4) | 29.9 (0.5) |
| 65 - 74 years                       | 29,062  | 69.7 (0.3)        | 50.5 (0.3) | 36.7 (0.3) | 27.1 (0.3) | 20.6 (0.4) |
| 75 years or over                    | 15,228  | 59.9 (0.4)        | 38.1 (0.4) | 24.9 (0.4) | 16.3 (0.4) | 11.2 (0.5) |
| <b>Sex</b>                          |         |                   |            |            |            |            |
| Male                                | 65,956  | 77.1 (0.2)        | 60.6 (0.2) | 48.3 (0.2) | 39.4 (0.3) | 32.7 (0.3) |
| Female                              | 55,603  | 79.1 (0.2)        | 63.8 (0.2) | 52.6 (0.3) | 43.4 (0.3) | 36.5 (0.4) |
| <b>Race</b>                         |         |                   |            |            |            |            |
| White                               | 80,973  | 76.4 (0.2)        | 59.4 (0.2) | 47.1 (0.2) | 38.0 (0.2) | 31.6 (0.3) |
| Black                               | 35,378  | 81.7 (0.2)        | 67.4 (0.3) | 56.3 (0.3) | 46.9 (0.4) | 39.3 (0.5) |
| Asian                               | 2,116   | 83.3 (0.8)        | 68.0 (1.1) | 55.8 (1.4) | 46.9 (1.7) | 41.8 (2.1) |
| American Indian                     | 1,334   | 81.4 (1.1)        | 64.3 (1.4) | 52.8 (1.7) | 43.5 (2.0) | 32.6 (2.7) |
| Other/Unknown                       | 1,758   | 78.6 (0.9)        | 64.7 (1.2) | 53.4 (1.4) | 45.6 (1.7) | 43.1 (2.1) |
| <b>Diagnosis</b>                    |         |                   |            |            |            |            |
| Diabetes                            | 36,185  | 73.1 (0.2)        | 51.8 (0.3) | 37.9 (0.3) | 27.8 (0.3) | 21.3 (0.4) |
| Glomerulonephritis                  | 17,943  | 84.5 (0.3)        | 71.3 (0.4) | 59.7 (0.5) | 50.6 (0.6) | 42.5 (0.8) |
| Hypertension                        | 31,072  | 80.1 (0.3)        | 66.0 (0.3) | 55.0 (0.3) | 46.6 (0.4) | 39.7 (0.5) |
| Polycystic kidney disease           | 4,572   | 89.3 (0.4)        | 79.4 (0.7) | 70.0 (0.9) | 60.1 (1.1) | 53.9 (1.5) |
| Interstitial nephropathy            | 4,761   | 82.2 (0.6)        | 69.0 (0.8) | 58.3 (0.9) | 49.7 (1.0) | 41.3 (1.3) |
| Obstructive nephropathy             | 3,006   | 78.1 (0.8)        | 66.2 (1.0) | 57.2 (1.1) | 49.0 (1.2) | 43.5 (1.5) |
| Other                               | 6,953   | 69.9 (0.5)        | 54.6 (0.7) | 43.9 (0.7) | 36.5 (0.8) | 31.0 (1.1) |
| Unknown                             | 17,067  | 77.5 (0.3)        | 63.1 (0.4) | 52.3 (0.5) | 44.2 (0.6) | 38.9 (0.7) |

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all dialysis patients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1985-88.

**Table 36**  
**Cadaver donor transplant patient survival, by age, sex, race, and primary diagnosis: 1985-88**

| Age, sex, race, and primary disease | Total  | Percent surviving |            |            |            |            |
|-------------------------------------|--------|-------------------|------------|------------|------------|------------|
|                                     |        | 1 year            | 2 years    | 3 years    | 4 years    | 5 years    |
| All persons                         | 24,974 | 91.8 (0.2)        | 87.9 (0.2) | 84.1 (0.2) | 80.0 (0.3) | 75.8 (0.4) |
| <b>Age</b>                          |        |                   |            |            |            |            |
| Under 15 years                      | 825    | 92.9 (0.9)        | 91.1 (1.0) | 88.5 (1.2) | 87.4 (1.3) | 86.4 (1.4) |
| 15 - 24 years                       | 2,471  | 96.3 (0.4)        | 94.4 (0.5) | 92.4 (0.6) | 89.8 (0.7) | 87.0 (0.9) |
| 25 - 34 years                       | 5,621  | 94.5 (0.3)        | 91.4 (0.4) | 88.9 (0.4) | 85.5 (0.5) | 82.1 (0.7) |
| 35 - 44 years                       | 6,921  | 92.9 (0.3)        | 88.8 (0.4) | 84.3 (0.5) | 80.1 (0.6) | 75.8 (0.7) |
| 45 - 54 years                       | 5,498  | 89.8 (0.4)        | 85.1 (0.5) | 80.8 (0.6) | 75.8 (0.7) | 70.4 (0.9) |
| 55 - 64 years                       | 3,132  | 86.2 (0.6)        | 80.8 (0.7) | 75.1 (0.8) | 70.3 (1.0) | 65.9 (1.2) |
| 65 - 74 years                       | 494    | 82.2 (1.7)        | 75.1 (2.0) | 70.4 (2.2) | 62.2 (2.9) | 54.6 (4.4) |
| 75 years or over                    | 12     | —                 | —          | —          | —          | —          |
| <b>Sex</b>                          |        |                   |            |            |            |            |
| Male                                | 15,625 | 91.5 (0.2)        | 87.3 (0.3) | 83.1 (0.3) | 78.9 (0.4) | 74.4 (0.5) |
| Female                              | 9,349  | 92.4 (0.3)        | 89.0 (0.3) | 85.8 (0.4) | 81.9 (0.5) | 78.3 (0.6) |
| <b>Race</b>                         |        |                   |            |            |            |            |
| White                               | 18,374 | 91.7 (0.2)        | 88.0 (0.2) | 84.2 (0.3) | 80.5 (0.3) | 76.2 (0.4) |
| Black                               | 5,709  | 92.0 (0.4)        | 87.6 (0.4) | 83.1 (0.5) | 78.0 (0.6) | 73.8 (0.8) |
| Asian                               | 532    | 92.3 (1.1)        | 88.5 (1.4) | 86.5 (1.5) | 84.8 (1.8) | 82.7 (2.2) |
| American Indian                     | 241    | 89.1 (2.1)        | 85.9 (2.3) | 83.6 (2.5) | 80.9 (3.0) | 78.2 (3.7) |
| Other/Unknown                       | 118    | 96.2 (1.5)        | 91.7 (2.0) | 90.6 (2.4) | 89.5 (3.1) | 89.5 (3.1) |
| <b>Diagnosis</b>                    |        |                   |            |            |            |            |
| Diabetes                            | 4,792  | 87.9 (0.5)        | 81.4 (0.6) | 75.4 (0.7) | 68.4 (0.8) | 61.5 (1.0) |
| Glomerulonephritis                  | 6,700  | 93.5 (0.3)        | 90.7 (0.4) | 87.4 (0.4) | 84.4 (0.5) | 80.7 (0.7) |
| Hypertension                        | 3,500  | 92.7 (0.5)        | 88.6 (0.6) | 83.8 (0.7) | 79.6 (0.8) | 76.4 (1.0) |
| Polycystic kidney disease           | 2,042  | 93.3 (0.6)        | 90.9 (0.7) | 88.6 (0.8) | 87.4 (0.9) | 85.4 (1.2) |
| Interstitial nephropathy            | 1,109  | 93.3 (0.7)        | 89.4 (0.9) | 87.4 (1.0) | 84.3 (1.2) | 80.4 (1.7) |
| Obstructive nephropathy             | 551    | 91.0 (1.1)        | 88.5 (1.3) | 85.1 (1.5) | 81.6 (1.7) | 80.1 (2.1) |
| Other                               | 1,753  | 91.5 (0.6)        | 88.0 (0.7) | 84.9 (0.8) | 81.6 (1.0) | 77.4 (1.3) |
| Unknown                             | 4,527  | 92.0 (0.4)        | 88.4 (0.5) | 84.6 (0.6) | 80.2 (0.7) | 76.1 (0.9) |
| <b>Transplant number</b>            |        |                   |            |            |            |            |
| First transplant                    | 21,195 | 92.1 (0.2)        | 88.2 (0.2) | 84.5 (0.3) | 80.4 (0.3) | 76.4 (0.4) |
| Subsequent transplants              | 3,779  | 90.5 (0.5)        | 86.3 (0.5) | 81.5 (0.6) | 76.9 (0.8) | 72.1 (1.0) |

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all cadaver donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1985-88.

**Table 37**  
**Living-related donor transplant patient survival, by age, sex, race, and primary diagnosis: 1985-88**

| Age, sex, race, and primary disease | Total | Percent surviving |            |            |            |            |
|-------------------------------------|-------|-------------------|------------|------------|------------|------------|
|                                     |       | 1 year            | 2 years    | 3 years    | 4 years    | 5 years    |
| All persons                         | 6,804 | 96.5 (0.2)        | 94.4 (0.3) | 92.9 (0.3) | 90.2 (0.4) | 87.8 (0.6) |
| <b>Age</b>                          |       |                   |            |            |            |            |
| Under 15 years                      | 704   | 97.4 (0.6)        | 96.1 (0.7) | 95.9 (0.8) | 95.1 (0.9) | 94.5 (1.1) |
| 15-24 years                         | 1,332 | 98.7 (0.3)        | 97.2 (0.5) | 96.2 (0.6) | 94.3 (0.8) | 93.2 (0.9) |
| 25-34 years                         | 2,147 | 96.8 (0.4)        | 95.2 (0.5) | 93.8 (0.5) | 91.7 (0.7) | 89.7 (0.9) |
| 35-44 years                         | 1,441 | 96.0 (0.5)        | 93.9 (0.6) | 92.6 (0.7) | 89.4 (1.0) | 87.2 (1.2) |
| 45-54 years                         | 825   | 93.7 (0.9)        | 89.7 (1.1) | 85.9 (1.3) | 81.9 (1.6) | 75.1 (2.2) |
| 55-64 years                         | 323   | 93.2 (1.4)        | 88.3 (1.8) | 87.1 (1.9) | 82.4 (2.5) | 76.5 (3.7) |
| 65-74 years                         | 29    | —                 | —          | —          | —          | —          |
| 75 years or over                    | 3     | —                 | —          | —          | —          | —          |
| <b>Sex</b>                          |       |                   |            |            |            |            |
| Male                                | 4,046 | 96.6 (0.3)        | 94.4 (0.4) | 92.6 (0.4) | 89.8 (0.6) | 87.6 (0.7) |
| Female                              | 2,758 | 96.5 (0.4)        | 94.3 (0.4) | 93.3 (0.5) | 91.1 (0.6) | 88.4 (0.9) |
| <b>Race</b>                         |       |                   |            |            |            |            |
| White                               | 5,806 | 96.6 (0.2)        | 94.5 (0.3) | 93.2 (0.3) | 90.6 (0.4) | 88.2 (0.6) |
| Black                               | 794   | 96.1 (0.7)        | 93.4 (0.9) | 90.5 (1.1) | 87.7 (1.4) | 85.4 (1.7) |
| Asian                               | 96    | 95.8 (2.0)        | 94.1 (2.3) | 94.1 (2.3) | 94.1 (2.3) | 94.1 (2.3) |
| American Indian                     | 79    | 98.4 (2.7)        | 95.9 (3.3) | 87.2 (4.2) | 80.5 (5.6) | 75.4 (6.9) |
| Other/unknown                       | 29    | —                 | —          | —          | —          | —          |
| <b>Diagnosis</b>                    |       |                   |            |            |            |            |
| Diabetes                            | 1,355 | 93.4 (0.7)        | 88.1 (0.9) | 84.8 (1.0) | 79.0 (1.2) | 76.0 (1.5) |
| Glomerulonephritis                  | 2,039 | 97.6 (0.3)        | 96.3 (0.4) | 95.4 (0.5) | 93.3 (0.7) | 90.6 (1.0) |
| Hypertension                        | 522   | 96.8 (0.9)        | 94.6 (1.2) | 93.4 (1.4) | 91.7 (1.6) | 90.3 (2.1) |
| Polycystic kidney disease           | 269   | 99.4 (0.7)        | 98.0 (1.2) | 97.8 (1.3) | 95.9 (1.9) | 95.5 (2.4) |
| Interstitial nephropathy            | 335   | 97.2 (0.9)        | 96.9 (1.0) | 95.5 (1.2) | 93.4 (1.5) | 91.6 (2.1) |
| Obstructive nephropathy             | 203   | 98.2 (1.1)        | 97.8 (1.2) | 97.8 (1.2) | 97.2 (1.5) | 97.2 (1.5) |
| Other                               | 746   | 96.5 (0.6)        | 92.5 (0.8) | 90.9 (0.9) | 89.5 (1.1) | 88.1 (1.2) |
| Unknown                             | 1,335 | 97.0 (0.5)        | 95.3 (0.6) | 94.5 (0.6) | 92.5 (0.8) | 90.0 (1.1) |
| <b>Transplant number</b>            |       |                   |            |            |            |            |
| First transplant                    | 6,408 | 96.6 (0.2)        | 94.6 (0.3) | 93.0 (0.3) | 90.4 (0.4) | 88.0 (0.6) |
| Subsequent transplants              | 396   | 94.4 (1.1)        | 90.7 (1.4) | 89.8 (1.5) | 86.7 (1.9) | 81.7 (2.9) |

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all living-related donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1985-88.

**Table 38**  
**Cadaver donor transplant graft survival of patients, by age, sex, race, and primary diagnosis: 1985-88**

| Age, sex, race, and primary disease | Total  | Percent surviving |            |            |            |            |
|-------------------------------------|--------|-------------------|------------|------------|------------|------------|
|                                     |        | 1 year            | 2 years    | 3 years    | 4 years    | 5 years    |
| All persons                         | 24,974 | 75.1 (0.3)        | 68.0 (0.3) | 62.0 (0.3) | 56.7 (0.4) | 52.0 (0.4) |
| <b>Age</b>                          |        |                   |            |            |            |            |
| Under 15 years                      | 825    | 68.2 (1.6)        | 58.9 (1.7) | 52.5 (1.8) | 48.8 (1.9) | 45.3 (2.2) |
| 15-24 years                         | 2,471  | 73.6 (0.9)        | 64.5 (1.0) | 58.0 (1.0) | 51.8 (1.1) | 46.7 (1.3) |
| 25-34 years                         | 5,621  | 76.4 (0.6)        | 69.1 (0.6) | 63.1 (0.7) | 57.9 (0.7) | 53.0 (0.9) |
| 35-44 years                         | 6,921  | 75.6 (0.5)        | 68.4 (0.6) | 62.1 (0.6) | 56.7 (0.7) | 51.9 (0.8) |
| 45-54 years                         | 5,498  | 75.5 (0.6)        | 69.4 (0.6) | 63.8 (0.7) | 58.4 (0.8) | 53.5 (0.9) |
| 55-64 years                         | 3,132  | 74.9 (0.8)        | 68.3 (0.8) | 62.6 (0.9) | 58.4 (1.0) | 54.0 (1.2) |
| 65-74 years                         | 494    | 70.5 (2.1)        | 65.3 (2.2) | 61.9 (2.3) | 54.4 (2.9) | 48.7 (4.0) |
| 75 years or over                    | 12     | —                 | —          | —          | —          | —          |
| <b>Sex</b>                          |        |                   |            |            |            |            |
| Male                                | 15,625 | 75.1 (0.4)        | 67.6 (0.4) | 61.4 (0.4) | 56.1 (0.5) | 51.4 (0.5) |
| Female                              | 9,349  | 75.1 (0.5)        | 68.6 (0.5) | 63.2 (0.5) | 57.9 (0.6) | 53.1 (0.7) |
| <b>Race</b>                         |        |                   |            |            |            |            |
| White                               | 18,374 | 75.9 (0.3)        | 70.1 (0.3) | 64.7 (0.4) | 59.8 (0.4) | 55.2 (0.5) |
| Black                               | 5,709  | 71.9 (0.6)        | 60.5 (0.7) | 52.4 (0.7) | 46.1 (0.8) | 40.6 (0.9) |
| Asian                               | 532    | 79.5 (1.7)        | 73.5 (1.9) | 69.8 (2.1) | 63.5 (2.5) | 60.6 (2.9) |
| American Indian                     | 241    | 74.3 (2.8)        | 67.0 (3.1) | 59.7 (3.3) | 56.1 (3.7) | 50.8 (4.8) |
| Other/unknown                       | 118    | 83.2 (0.4)        | 78.6 (3.7) | 77.5 (4.4) | 74.1 (4.4) | 74.1 (7.4) |
| <b>Diagnosis</b>                    |        |                   |            |            |            |            |
| Diabetes                            | 4,792  | 73.8 (0.6)        | 66.4 (0.7) | 60.0 (0.7) | 53.4 (0.8) | 47.1 (1.0) |
| Glomerulonephritis                  | 6,700  | 76.3 (0.5)        | 70.0 (0.6) | 64.2 (0.6) | 60.2 (0.7) | 56.2 (0.8) |
| Hypertension                        | 3,500  | 73.9 (0.7)        | 63.1 (0.8) | 55.9 (0.9) | 50.5 (1.0) | 45.0 (1.2) |
| Polycystic kidney disease           | 2,042  | 75.4 (0.9)        | 70.5 (1.0) | 66.8 (1.1) | 65.0 (1.2) | 62.3 (1.4) |
| Interstitial nephropathy            | 1,109  | 76.8 (1.3)        | 70.1 (1.4) | 66.3 (1.5) | 62.7 (1.6) | 58.4 (1.9) |
| Obstructive nephropathy             | 551    | 74.1 (1.9)        | 68.6 (2.0) | 62.6 (2.2) | 58.5 (2.3) | 57.1 (2.6) |
| Other                               | 1,753  | 74.3 (1.1)        | 67.9 (1.2) | 63.3 (1.2) | 58.7 (1.3) | 53.3 (1.6) |
| Unknown                             | 4,527  | 75.6 (0.6)        | 68.8 (0.7) | 62.0 (0.8) | 54.9 (0.9) | 49.7 (1.0) |
| <b>Transplant number</b>            |        |                   |            |            |            |            |
| First transplant                    | 21,195 | 76.6 (0.3)        | 69.5 (0.3) | 63.5 (0.4) | 58.2 (0.4) | 53.4 (0.5) |
| Subsequent transplants              | 3,779  | 65.7 (0.8)        | 59.2 (0.8) | 53.4 (0.9) | 48.4 (0.9) | 44.0 (1.1) |

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all cadaver donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1985-88.

**Table 39**  
**Living-related donor transplant graft survival of patients, by age,  
 sex, race, and primary diagnosis: 1985-88**

| Age, sex, race, and primary disease | Total | Percent surviving |            |            |            |            |
|-------------------------------------|-------|-------------------|------------|------------|------------|------------|
|                                     |       | 1 year            | 2 years    | 3 years    | 4 years    | 5 years    |
| All persons                         | 6,804 | 88.7 (0.4)        | 84.1 (0.5) | 80.1 (0.5) | 76.1 (0.6) | 72.4 (0.7) |
| <b>Age</b>                          |       |                   |            |            |            |            |
| Under 15 years                      | 704   | 86.2 (1.3)        | 81.4 (1.5) | 77.7 (1.6) | 74.6 (1.8) | 71.8 (2.2) |
| 15 - 24 years                       | 1,332 | 90.3 (0.8)        | 83.7 (1.0) | 78.2 (1.2) | 73.6 (1.4) | 70.2 (1.6) |
| 25 - 34 years                       | 2,147 | 89.7 (0.7)        | 86.1 (0.8) | 82.4 (0.9) | 78.5 (1.0) | 75.0 (1.2) |
| 35 - 44 years                       | 1,441 | 89.0 (0.8)        | 85.8 (0.9) | 82.2 (1.1) | 78.4 (1.2) | 75.6 (1.5) |
| 45 - 54 years                       | 825   | 86.9 (1.2)        | 81.5 (1.4) | 76.9 (1.5) | 72.4 (1.8) | 66.9 (2.2) |
| 55 - 64 years                       | 323   | 85.5 (2.0)        | 79.9 (2.3) | 78.6 (2.3) | 74.0 (2.8) | 67.8 (3.9) |
| 65 - 74 years                       | 29    | —                 | —          | —          | —          | —          |
| 75 years or over                    | 3     | —                 | —          | —          | —          | —          |
| <b>Sex</b>                          |       |                   |            |            |            |            |
| Male                                | 4,046 | 88.5 (0.5)        | 83.9 (0.6) | 79.5 (0.7) | 75.3 (0.8) | 71.6 (0.9) |
| Female                              | 2,758 | 89.0 (0.6)        | 84.5 (0.7) | 81.0 (0.8) | 77.3 (0.9) | 73.7 (1.1) |
| <b>Race</b>                         |       |                   |            |            |            |            |
| White                               | 5,806 | 89.4 (0.4)        | 85.6 (0.5) | 81.9 (0.5) | 78.2 (0.6) | 74.6 (0.8) |
| Black                               | 794   | 83.1 (1.3)        | 73.6 (1.6) | 66.7 (1.8) | 59.9 (2.0) | 56.3 (2.3) |
| Asian                               | 96    | 90.7 (3.1)        | 88.0 (3.4) | 88.0 (3.4) | 88.0 (3.4) | 85.1 (5.1) |
| American Indian                     | 79    | 89.8 (3.7)        | 83.1 (4.5) | 76.2 (5.3) | 69.6 (6.2) | 64.9 (8.2) |
| Other/unknown                       | 29    | —                 | —          | —          | —          | —          |
| <b>Diagnosis</b>                    |       |                   |            |            |            |            |
| Diabetes                            | 1,355 | 84.2 (1.0)        | 79.4 (1.1) | 75.3 (1.2) | 71.5 (1.3) | 67.4 (1.7) |
| Glomerulonephritis                  | 2,039 | 89.5 (0.7)        | 84.5 (0.8) | 80.6 (0.9) | 77.5 (1.0) | 73.8 (1.3) |
| Hypertension                        | 522   | 88.4 (1.5)        | 80.1 (1.8) | 74.1 (2.1) | 68.9 (2.3) | 64.2 (2.9) |
| Polycystic kidney disease           | 269   | 92.0 (1.7)        | 89.1 (2.1) | 86.4 (2.4) | 84.3 (2.7) | 80.1 (3.3) |
| Interstitial nephropathy            | 335   | 87.4 (1.8)        | 86.3 (1.9) | 81.2 (2.2) | 79.7 (2.4) | 78.2 (2.7) |
| Obstructive nephropathy             | 203   | 93.9 (1.8)        | 89.7 (2.3) | 86.9 (2.4) | 84.8 (2.7) | 82.4 (4.0) |
| Other                               | 746   | 86.2 (1.2)        | 81.8 (1.4) | 78.7 (1.5) | 73.5 (1.9) | 73.5 (1.9) |
| Unknown                             | 1,335 | 91.4 (0.8)        | 87.5 (0.9) | 83.7 (1.1) | 78.8 (1.3) | 74.5 (1.6) |
| <b>Transplant number</b>            |       |                   |            |            |            |            |
| First transplant                    | 6,408 | 89.0 (0.4)        | 84.4 (0.5) | 80.2 (0.5) | 76.2 (0.6) | 72.6 (0.7) |
| Subsequent transplants              | 396   | 84.0 (1.8)        | 79.9 (2.0) | 77.8 (2.2) | 73.7 (2.6) | 68.8 (3.4) |

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all living-related donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, March 1990 update, 1985-88.

# Hospital inpatient utilization

## Data

The number and duration of hospitalizations billed to HCFA on behalf of Medicare ESRD beneficiaries are shown in Tables 45 through 50. The hospitalization data come from the Medicare Automated Data Retrieval System (MADRS) which contains selected expenditure and medical information for each hospitalization. These hospitalization records were linked with personal identification records from the ESRD Program Management and Medical Information System (PMMIS). The number of hospital discharges and the total number of days hospitalized per year were calculated for each beneficiary.

The analysis was performed for calendar years 1984-88 and includes all people who were alive, Medicare entitled, and ESRD at any time during the observation year. For each calendar year, patients were classified into one of four mutually exclusive treatment groups: (1) patients on dialysis for the entire calendar year (or that part of the year they were alive, Medicare entitled, and ESRD); (2) patients who received a kidney transplant during the year; (3) patients who had a functioning graft the entire part of the year they were alive and entitled; and (4) patients who experienced a graft failure, but did not have a transplantation during that same calendar year.

A qualification on these expenditure data concerns the provisions of Medicare as a secondary payer. Beginning in 1981, Medicare became the secondary payer for care for ESRD patients in their first year of Medicare coverage if they have another insurance carrier and if they are entitled to Medicare solely because of ESRD (i.e., not because of disability and not because they are 65 years of age or over). The extent of coverage of, and payment for, services by other payers is not well known because Medicare may not receive copies of bills for these services.

In Tables 41 to 45, beneficiaries for whom Medicare was or may have been the secondary payer (MSP) insurer were excluded. In order to reduce biases due to MSP, persons under 65 years of age must have had ESRD for at least one year prior to January 1 of the observation year to be included in these tables. Table 40 includes Medicare secondary payer beneficiaries since the purpose is to show total Medicare covered hospitalizations. The per patient data in Tables 41 to 45 exclude Medicare secondary payer beneficiaries, and all persons who were potentially Medicare secondary payer beneficiaries, so that these tables may be used to show the amounts of services needed on the average by ESRD patients.

This section presents information about the number of hospital stays, time spent in inpatient status, and average length of stay. Medicare expenditures for inpatient services are presented in the next section, along with expenditures for other services.

## Results

Table 40 shows the total Medicare covered hospitalization experience of the Medicare ESRD

population from 1984 through 1988. The number of Medicare covered hospitalizations increased from 173,000 in 1984 to 227,600 in 1988, an average annual increase of 7.1 percent. During this same time, the total number of inpatient days increased from 1.65 million to 2.14 million, an average annual increase of 6.6 percent. The slower rate of increase in hospitalized days compared to hospitalizations was due to a slight decrease in average length of stay, from 9.6 days in 1984 to 9.4 days in 1988. In 1988, dialysis patients accounted for 81.8 percent of all hospitalizations among ESRD beneficiaries while transplant recipients accounted for 8.2 percent of hospitalizations.

Table 41 shows hospitalization rates (discharges per person and hospital days per person) by patient treatment group. Excluded from Table 41 are persons for whom Medicare was the secondary payer as well as persons for whom Medicare may have been the secondary payer. All patient groups experienced slight declines in hospitalization from 1984 to 1988. In 1988 dialysis patients were hospitalized an average of 1.58 times per person. This was down slightly from the 1.62 hospitalizations in 1984. Dialysis patients spent an average of 15.25 days in the hospital in 1988, a level virtually unchanged from the 1984 rate of 15.29 days. The average length of stay for dialysis patients increased from 9.4 days in 1984 to 9.6 days in 1988. Transplant recipients were hospitalized an average of 2.70 times in 1988, down from 2.88 in 1984. Total days spent in the hospital declined by over 6 days for transplant recipients, from 38.00 days to 31.87 days in 1984 and 1988, respectively. Persons with a functioning kidney graft had the lowest overall hospitalization rates. In 1988 they were hospitalized an average of .66 times per person, down from .84 times in 1984. The total hospitalized days per functioning graft patient declined from 7.80 days in 1984 to 5.58 days in 1988. Those persons whose grafts failed experienced the highest hospitalization rates. In each of the years shown, these persons averaged about 3 hospitalizations per person. However, due to a declining average length of stay (from 10.3 days in 1984 to 9.0 days in 1988) the total hospitalized days also declined (from 32.10 days per person in 1988 to 26.74 days per person in 1988,--a 4.5 percent annual decline in per capita hospital days).

Per capita discharges and inpatient days during 1988 by age, sex, race, and primary diagnosis for renal failure are shown in Tables 42 through 45. There is a separate table for each of the four treatment groups: dialysis, transplant, functioning graft, and graft failure. To examine utilization, it is necessary to adjust for varying lengths of entitlement periods for patients during the year. That is, the data must be annualized for patients who become ESRD during the year and those who die during the year because their records would not reflect a full year's utilization. For this reason, Tables 42 through 45 present the average number of days during the year that people in each group were ESRD and Medicare entitled and display both unadjusted and annualized data. The annualized values are estimated by a linear extrapolation of the basic

per capita figures to a full year (365 days) of coverage. Annualization is most important for the age groups and primary diagnosis classifications since, in general, older people and diabetics have the fewest numbers of days at risk. Unless otherwise stated, and except for average lengths of stay, all results are based on annualized values.

Inpatient utilization for dialysis patients during 1988 is shown in Table 42. The average length of stay and number of days hospitalized increased with age. For example, average length of stay increased from 7.36 days per stay for patients under age 15 to 10.87 for those over 74 years of age. Patients over 74 years of age were hospitalized twice as many days per year as patients in the age groups under 45. Women were hospitalized more than men (2.01 versus 1.86 discharges and 20.0 versus 17.44 inpatient days, respectively). On the average, American Indians were hospitalized more times than any other racial group (2.26 discharges) followed by white persons (2.04 discharges) and black persons (1.84 discharges). However, white persons had more hospital days on the average than any other racial group at 19.91 days. Dialysis patients who had diabetes or hypertension as their primary diagnosis had more hospitalizations (2.58 and 2.11, respectively) and inpatient days (27.07 and 20.48, respectively) than those patients with other primary diagnoses.

Table 43 shows hospitalization rates by demographic group for transplant recipients. There was less age effect on hospitalization rates among transplant recipients than among dialysis patients.

Transplant patients had the highest number of inpatient days (33.33) and days per stay (11.76) of any treatment group. Patients under 15 years of age had the highest number of discharges per patient (4.12) and the highest number of days per patient (39.76). There were no major differences between males and females. Asians were hospitalized less often and for fewer days than other racial

groups. Patients whose primary diagnosis was diabetes had more inpatient days (40.75), and were hospitalized more often (3.50), than any other diagnosis group. However, patients with hypertension had the longest average length per stay (12.70) days.

Functioning graft patients, as shown in Table 44, had the lowest use of inpatient services with 0.70 discharges, 5.92 inpatient days, and an average length of stay of 8.38. Days of hospitalization increased with age due predominantly to longer average lengths of stay. Males and females showed only minor differences. Black persons and American Indians were hospitalized for more total days and more often than white or Asian persons. Patients with diabetes as their cause of ESRD represented 35.0 percent of all hospital days although they comprised only 16.8 percent of all functioning graft patients. Persons with diabetes were hospitalized twice as often and spent twice as many days in the hospital as any other diagnostic group among functioning graft patients.

Inpatient utilization for graft failure patients is shown in Table 45. Patients experiencing a graft failure had the highest number of hospitalizations (3.32 per year), of any treatment group. Persons under 15 years of age had the most discharges (4.61) in this treatment category. Starting with the 15-24 age group, days in the hospital increased with advancing age, due mainly to longer average lengths of stay when hospitalized. Females who lost a graft were hospitalized more often than males (3.63 and 3.16 discharges, respectively) and for more days per person (33.22 and 28.26 days, respectively). White persons were hospitalized more than black persons (31.35 and 28.07 inpatient days, respectively). Patients with diabetes as their primary diagnosis had 4.77 hospitalizations per year which averaged 11.27 days each. This group represented 20.9 percent of total days hospitalized although they comprised only 12.3 percent of graft failures.

**Table 40**  
**Medicare end stage renal disease program inpatient hospital utilization**  
**by patient treatment group: 1984-88**

|                          | 1984    | 1985    | 1986    | 1987    | 1988    | Average annual percent change |
|--------------------------|---------|---------|---------|---------|---------|-------------------------------|
| <b>Total</b>             |         |         |         |         |         |                               |
| Number of patients       | 113,542 | 125,378 | 136,957 | 148,771 | 161,084 | 9.1                           |
| Discharges in thousands  | 173.0   | 183.5   | 199.8   | 212.8   | 227.6   | 7.1                           |
| Days in thousands        | 1,653.2 | 1,697.9 | 1,851.3 | 1,995.2 | 2,137.7 | 6.6                           |
| Average length of stay   | 9.6     | 9.3     | 9.3     | 9.4     | 9.4     | -0.5                          |
| <b>Dialysis</b>          |         |         |         |         |         |                               |
| Number of patients       | 93,695  | 101,951 | 109,060 | 116,858 | 125,724 | 7.6                           |
| Discharges in thousands  | 143.0   | 151.2   | 162.3   | 172.4   | 186.2   | 6.8                           |
| Days in thousands        | 1,316.8 | 1,371.9 | 1,470.4 | 1,594.2 | 1,736.8 | 7.2                           |
| Average length of stay   | 9.2     | 9.1     | 9.1     | 9.2     | 9.3     | 0.3                           |
| <b>Transplant</b>        |         |         |         |         |         |                               |
| Number of patients       | 6,312   | 7,026   | 8,274   | 8,235   | 8,114   | 6.5                           |
| Discharges in thousands  | 16.1    | 17.2    | 19.5    | 19.3    | 18.7    | 3.8                           |
| Days in thousands        | 202.9   | 197.3   | 227.5   | 222.7   | 208.8   | 0.7                           |
| Average length of stay   | 12.6    | 11.5    | 11.7    | 11.6    | 11.2    | -2.9                          |
| <b>Functioning Graft</b> |         |         |         |         |         |                               |
| Number of patients       | 12,504  | 15,298  | 18,408  | 22,181  | 25,603  | 19.6                          |
| Discharges in thousands  | 10.8    | 12.0    | 14.4    | 16.6    | 17.9    | 13.5                          |
| Days in thousands        | 100.2   | 100.0   | 120.7   | 138.6   | 149.2   | 10.5                          |
| Average length of stay   | 9.3     | 8.3     | 8.4     | 8.4     | 8.3     | -2.8                          |
| <b>Graft Failure</b>     |         |         |         |         |         |                               |
| Number of patients       | 1,031   | 1,103   | 1,215   | 1,497   | 1,643   | 12.4                          |
| Discharges in thousands  | 3.2     | 3.1     | 3.6     | 4.5     | 4.8     | 10.7                          |
| Days in thousands        | 33.3    | 28.6    | 32.7    | 39.6    | 42.9    | 6.5                           |
| Average length of stay   | 10.5    | 9.1     | 9.2     | 8.7     | 8.9     | -4.0                          |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy; Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update, 1984-88.

**Table 41**  
**Medicare end stage renal disease program inpatient hospital utilization**  
**by patient treatment group: 1984-88 (excludes Medicare secondary payer patients)**

|                          | 1984   | 1985   | 1986    | 1987    | 1988    | Average annual percent change |
|--------------------------|--------|--------|---------|---------|---------|-------------------------------|
| <b>Total</b>             |        |        |         |         |         |                               |
| Number of patients       | 85,290 | 94,611 | 103,564 | 112,528 | 121,290 | 9.2                           |
| Discharges per patient   | 1.58   | 1.50   | 1.51    | 1.48    | 1.46    | -2.0                          |
| Days per patient         | 15.26  | 14.10  | 14.18   | 14.07   | 14.07   | -2.0                          |
| Average length of stay   | 9.7    | 9.4    | 9.4     | 9.5     | 9.6     | -0.2                          |
| <b>Dialysis</b>          |        |        |         |         |         |                               |
| Number of patients       | 70,185 | 76,556 | 81,981  | 87,644  | 92,963  | 7.3                           |
| Discharges per patient   | 1.62   | 1.56   | 1.58    | 1.57    | 1.58    | -0.6                          |
| Days per patient         | 15.29  | 14.52  | 14.65   | 14.88   | 15.25   | -0.1                          |
| Average length of stay   | 9.4    | 9.3    | 9.2     | 9.5     | 9.6     | 0.6                           |
| <b>Transplant</b>        |        |        |         |         |         |                               |
| Number of patients       | 2,947  | 3,306  | 3,900   | 3,786   | 3,850   | 6.9                           |
| Discharges per patient   | 2.88   | 2.79   | 2.74    | 2.75    | 2.70    | -1.6                          |
| Days per patient         | 38.00  | 33.13  | 33.42   | 32.84   | 31.87   | -4.3                          |
| Average length of stay   | 13.2   | 11.9   | 12.2    | 11.9    | 11.8    | -2.8                          |
| <b>Functioning Graft</b> |        |        |         |         |         |                               |
| Number of patients       | 11,275 | 13,788 | 16,627  | 19,811  | 23,076  | 19.6                          |
| Discharges per patient   | 0.84   | 0.77   | 0.76    | 0.72    | 0.66    | -5.9                          |
| Days per patient         | 7.80   | 6.50   | 6.51    | 6.09    | 5.58    | -8.0                          |
| Average length of stay   | 9.2    | 8.4    | 8.5     | 8.4     | 8.4     | -2.3                          |
| <b>Graft Failure</b>     |        |        |         |         |         |                               |
| Number of patients       | 883    | 961    | 1,056   | 1,287   | 1,401   | 12.2                          |
| Discharges per patient   | 3.10   | 2.85   | 2.97    | 3.06    | 2.96    | -1.1                          |
| Days per patient         | 32.10  | 26.20  | 27.63   | 26.75   | 26.74   | -4.5                          |
| Average length of stay   | 10.3   | 9.2    | 9.3     | 8.7     | 9.0     | -3.3                          |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy; Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update, 1984-88.

**Table 42**  
**Medicare end stage renal disease inpatient utilization by age, sex,  
 race and diagnosis: 1988 dialysis patients (excludes Medicare secondary payer patients)**

| Age, Sex, race and<br>and primary diagnosis | Number of<br>patients | Number<br>of days | Discharges<br>per patient | Days per<br>patient | Average<br>length of<br>stay | Annualized<br>discharge<br>per patient | Annualized<br>days per<br>patient |
|---|-----------------------|-------------------|---------------------------|---------------------|------------------------------|--|-----------------------------------|
| Total                                       | 92,963                | 298               | 1.58                      | 15.25               | 9.62                         | 1.94                                   | 18.73                             |
| <b>Age</b>                                  |                       |                   |                           |                     |                              |  |                                   |
| Under 15 years                              | 342                   | 349               | 1.73                      | 12.80               | 7.36                         | 1.81                                   | 13.42                             |
| 15-24 years                                 | 1,615                 | 353               | 1.57                      | 11.59               | 7.34                         | 1.63                                   | 12.02                             |
| 25-34 years                                 | 5,553                 | 344               | 1.53                      | 12.03               | 7.82                         | 1.63                                   | 12.80                             |
| 35-44 years                                 | 8,732                 | 341               | 1.43                      | 11.66               | 8.15                         | 1.53                                   | 12.51                             |
| 45-54 years                                 | 11,115                | 333               | 1.46                      | 12.78               | 8.72                         | 1.60                                   | 14.05                             |
| 55-64 years                                 | 18,209                | 314               | 1.53                      | 14.17               | 9.24                         | 1.78                                   | 16.52                             |
| 65-74 years                                 | 30,714                | 276               | 1.62                      | 16.64               | 10.22                        | 2.15                                   | 22.07                             |
| 75 years or over                            | 16,683                | 256               | 1.73                      | 18.86               | 10.87                        | 2.47                                   | 26.96                             |
| <b>Sex</b>                                  |                       |                   |                           |                     |                              |  |                                   |
| Male  | 47,596                | 297               | 1.51                      | 14.15               | 9.34                         | 1.86                                   | 17.44                             |
| Female                                      | 45,367                | 300               | 1.65                      | 16.40               | 9.89                         | 2.01                                   | 20.01                             |
| <b>Race</b>                                 |                       |                   |                           |                     |                              |  |                                   |
| Asian                                       | 1,241                 | 298               | 1.12                      | 11.37               | 10.07                        | 1.38                                   | 13.96                             |
| Black                                       | 30,507                | 313               | 1.57                      | 14.90               | 9.45                         | 1.84                                   | 17.42                             |
| White                                       | 58,537                | 289               | 1.61                      | 15.72               | 9.74                         | 2.04                                   | 19.91                             |
| American Indian                             | 808                   | 299               | 1.85                      | 13.98               | 7.54                         | 2.26                                   | 17.11                             |
| Other/unknown                               | 1,870                 | 333               | 0.99                      | 9.45                | 9.54                         | 1.09                                   | 10.39                             |
| <b>Diagnosis</b>                            |                       |                   |                           |                     |                              |  |                                   |
| Diabetes                                    | 19,422                | 272               | 1.92                      | 20.12               | 10.43                        | 2.58                                   | 27.07                             |
| Glomerulonephritis                          | 14,440                | 317               | 1.48                      | 13.06               | 8.81                         | 1.71                                   | 15.08                             |
| Hypertension                                | 25,201                | 284               | 1.64                      | 15.89               | 9.64                         | 2.11                                   | 20.48                             |
| Polycystic kidney disease                   | 4,088                 | 327               | 1.35                      | 11.72               | 8.65                         | 1.51                                   | 13.12                             |
| Interstitial nephropathy                    | 3,803                 | 306               | 1.61                      | 15.22               | 9.41                         | 1.93                                   | 18.20                             |
| Obstructive nephropathy                     | 3,077                 | 301               | 1.43                      | 14.47               | 10.06                        | 1.74                                   | 17.59                             |
| Other                                       | 4,240                 | 297               | 1.63                      | 15.72               | 9.64                         | 2.01                                   | 19.37                             |
| Unknown                                     | 18,692                | 322               | 1.27                      | 11.81               | 9.25                         | 1.44                                   | 13.42                             |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update, 1988.

Table 43

**Medicare end stage renal disease inpatient utilization by age, sex, race  
and diagnosis: 1988 transplant patients (excludes Medicare secondary payer patients)**

| Age, sex, race and primary diagnosis | Number of patients | Number of days | Discharges per patient | Days per patient | Average length of stay | Annualized discharge per patient | Annualized days per patient |
|--------------------------------------|--------------------|----------------|------------------------|------------------|------------------------|----------------------------------|-----------------------------|
| Total                                | 3,850              | 350            | 2.70                   | 31.87            | 11.76                  | 2.82                             | 33.33                       |
| <b>Age</b>                           |                    |                |                        |                  |                        |                                  |                             |
| Under 15 years                       | 108                | 351            | 3.95                   | 38.13            | 9.64                   | 4.12                             | 39.76                       |
| 15-24 years                          | 319                | 355            | 2.79                   | 29.41            | 10.53                  | 2.88                             | 30.32                       |
| 25-34 years                          | 839                | 351            | 2.82                   | 31.37            | 11.11                  | 2.94                             | 32.71                       |
| 35-44 years                          | 1,020              | 352            | 2.63                   | 32.09            | 12.18                  | 2.73                             | 33.37                       |
| 45-54 years                          | 820                | 352            | 2.54                   | 32.31            | 12.67                  | 2.64                             | 33.60                       |
| 55-64 years                          | 558                | 344            | 2.69                   | 31.61            | 11.74                  | 2.86                             | 33.63                       |
| 65-74 years                          | 179                | 336            | 2.52                   | 32.89            | 13.02                  | 2.75                             | 35.83                       |
| 75 years or over                     | 7                  | —              | —                      | —                | —                      | —                                | —                           |
| <b>Sex</b>                           |                    |                |                        |                  |                        |                                  |                             |
| Male                                 | 2,251              | 349            | 2.69                   | 31.94            | 11.84                  | 2.82                             | 33.50                       |
| Female                               | 1,599              | 351            | 2.72                   | 31.76            | 11.65                  | 2.84                             | 33.12                       |
| <b>Race</b>                          |                    |                |                        |                  |                        |                                  |                             |
| Asian                                | 81                 | 351            | 2.22                   | 27.54            | 12.39                  | 2.31                             | 28.72                       |
| Black                                | 996                | 354            | 2.60                   | 32.48            | 12.44                  | 2.69                             | 33.58                       |
| White                                | 2,700              | 349            | 2.75                   | 31.78            | 11.53                  | 2.88                             | 33.33                       |
| American Indian                      | 51                 | 347            | 2.84                   | 33.09            | 11.64                  | 3.00                             | 34.90                       |
| Other/unknown                        | 22                 | —              | —                      | —                | —                      | —                                | —                           |
| <b>Diagnosis</b>                     |                    |                |                        |                  |                        |                                  |                             |
| Diabetes                             | 576                | 342            | 3.27                   | 38.08            | 11.64                  | 3.50                             | 40.75                       |
| Glomerulonephritis                   | 1,096              | 354            | 2.57                   | 29.13            | 11.32                  | 2.66                             | 30.12                       |
| Hypertension                         | 613                | 354            | 2.45                   | 31.22            | 12.70                  | 2.53                             | 32.28                       |
| Polycystic kidney disease            | 300                | 354            | 2.57                   | 29.12            | 11.30                  | 2.66                             | 30.11                       |
| Interstitial nephropathy             | 146                | 357            | 2.63                   | 30.88            | 11.74                  | 2.70                             | 31.66                       |
| Obstructive nephropathy              | 87                 | 344            | 3.19                   | 35.18            | 11.01                  | 3.39                             | 37.43                       |
| Other                                | 320                | 354            | 2.77                   | 31.05            | 11.17                  | 2.86                             | 32.10                       |
| Unknown                              | 712                | 344            | 2.66                   | 32.96            | 12.36                  | 2.83                             | 35.07                       |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update, 1988.

**Table 44**  
**Medicare end stage renal disease inpatient utilization by age, sex, race  
and diagnosis: 1988 functioning graft patients (excludes Medicare secondary payer patients)**

| Age, Sex, race and<br>and primary diagnosis | Number of<br>patients | Number<br>of days | Discharges<br>per patient | Days per<br>patient | Average<br>length of<br>stay | Annualized<br>discharge<br>per patient | Annualized<br>days per<br>patient |
|---|-----------------------|-------------------|---------------------------|---------------------|------------------------------|--|-----------------------------------|
| Total                                       | 23,076                | 345               | 0.66                      | 5.58                | 8.38                         | 0.70                                   | 5.92                              |
| <b>Age</b>                                  |                       |                   |                           |                     |                              |  |                                   |
| Under 15 years                              | 591                   | 336               | 0.68                      | 3.68                | 5.34                         | 0.74                                   | 4.01                              |
| 15-24 years                                 | 1,835                 | 342               | 0.60                      | 4.19                | 6.98                         | 0.64                                   | 4.48                              |
| 25-34 years                                 | 5,422                 | 345               | 0.64                      | 5.07                | 7.83                         | 0.68                                   | 5.38                              |
| 35-44 years                                 | 6,503                 | 347               | 0.64                      | 5.46                | 8.46                         | 0.68                                   | 5.76                              |
| 45-54 years                                 | 4,976                 | 344               | 0.68                      | 6.11                | 8.96                         | 0.72                                   | 6.50                              |
| 55-64 years                                 | 2,999                 | 346               | 0.72                      | 6.54                | 9.05                         | 0.76                                   | 6.92                              |
| 65-74 years                                 | 711                   | 348               | 0.79                      | 7.94                | 10.05                        | 0.83                                   | 8.35                              |
| 75 years or over                            | 39                    | 335               | 0.56                      | 6.28                | 11.13                        | 0.61                                   | 6.86                              |
| <b>Sex</b>                                  |                       |                   |                           |                     |                              |  |                                   |
| Male  | 14,337                | 345               | 0.65                      | 5.63                | 8.65                         | 0.69                                   | 5.97                              |
| Female                                      | 8,739                 | 345               | 0.69                      | 5.50                | 7.98                         | 0.73                                   | 5.83                              |
| <b>Race</b>                                 |                       |                   |                           |                     |                              |  |                                   |
| Asian                                       | 419                   | 346               | 0.45                      | 3.74                | 8.22                         | 0.48                                   | 3.96                              |
| Black                                       | 4,016                 | 349               | 0.81                      | 6.88                | 8.43                         | 0.85                                   | 7.22                              |
| White                                       | 18,208                | 344               | 0.63                      | 5.37                | 8.40                         | 0.67                                   | 5.71                              |
| American Indian                             | 186                   | 356               | 0.77                      | 6.16                | 7.90                         | 0.79                                   | 6.33                              |
| Other/unknown                               | 247                   | 354               | 0.42                      | 2.71                | 6.38                         | 0.43                                   | 2.80                              |
| <b>Diagnosis</b>                            |                       |                   |                           |                     |                              |  |                                   |
| Diabetes                                    | 3,871                 | 345               | 1.17                      | 11.63               | 9.91                         | 1.24                                   | 12.34                             |
| Glomerulonephritis                          | 6,398                 | 345               | 0.51                      | 3.74                | 7.24                         | 0.54                                   | 3.97                              |
| Hypertension                                | 2,473                 | 349               | 0.65                      | 5.36                | 8.17                         | 0.68                                   | 5.62                              |
| Polycystic kidney disease                   | 1,505                 | 345               | 0.53                      | 4.19                | 7.90                         | 0.56                                   | 4.45                              |
| Interstitial nephropathy                    | 997                   | 347               | 0.53                      | 4.18                | 7.89                         | 0.56                                   | 4.41                              |
| Obstructive nephropathy                     | 712                   | 347               | 0.60                      | 4.15                | 6.85                         | 0.63                                   | 4.38                              |
| Other                                       | 1,455                 | 340               | 0.56                      | 3.76                | 6.62                         | 0.60                                   | 4.05                              |
| Unknown                                     | 5,665                 | 345               | 0.58                      | 4.88                | 8.37                         | 0.62                                   | 5.18                              |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update, 1988.

Table 45

**Medicare end stage renal disease inpatient utilization by age, sex,  
race and diagnosis: 1988 graft failure patients (excludes Medicare secondary payer patients)**

| Age, Sex, race and<br>and primary diagnosis | Number of<br>patients | Number<br>of days | Discharges<br>per patient | Days per<br>patient | Average<br>length of<br>stay | Annualized<br>discharge<br>per patient | Annualized<br>days per<br>patient |
|---|-----------------------|-------------------|---------------------------|---------------------|------------------------------|--|-----------------------------------|
| Total                                       | 1,401                 | 326               | 2.96                      | 26.74               | 9.01                         | 3.32                                   | 30.02                             |
| <b>Age</b>                                  |                       |                   |                           |                     |                              |  |                                   |
| Under 15 years                              | 37                    | 343               | 4.32                      | 29.40               | 6.80                         | 4.61                                   | 31.37                             |
| 15-24 years                                 | 204                   | 328               | 2.69                      | 20.35               | 7.56                         | 3.00                                   | 22.71                             |
| 25-34 years                                 | 364                   | 338               | 3.29                      | 26.79               | 8.13                         | 3.56                                   | 29.01                             |
| 35-44 years                                 | 387                   | 323               | 2.80                      | 26.76               | 9.53                         | 3.17                                   | 30.32                             |
| 45-54 years                                 | 247                   | 309               | 2.59                      | 26.40               | 10.17                        | 3.07                                   | 31.27                             |
| 55-64 years                                 | 133                   | 324               | 3.16                      | 34.87               | 11.01                        | 3.57                                   | 39.39                             |
| 65-74 years                                 | 29                    | —                 | —                         | —                   | —                            | —                                      | —                                 |
| 75 years or over                            | 0                     | —                 | —                         | —                   | —                            | —                                      | —                                 |
| <b>Sex</b>                                  |                       |                   |                           |                     |                              |  |                                   |
| Male  | 879                   | 330               | 2.85                      | 25.48               | 8.92                         | 3.16                                   | 28.26                             |
| Female                                      | 522                   | 318               | 3.15                      | 28.86               | 9.15                         | 3.63                                   | 33.22                             |
| <b>Race</b>                                 |                       |                   |                           |                     |                              |  |                                   |
| Asian                                       | 20                    | —                 | —                         | —                   | —                            | —                                      | —                                 |
| Black                                       | 40                    | 342               | 2.92                      | 26.23               | 8.96                         | 3.12                                   | 28.07                             |
| White                                       | 913                   | 318               | 2.99                      | 27.24               | 9.11                         | 3.44                                   | 31.35                             |
| American Indian                             | 18                    | —                 | —                         | —                   | —                            | —                                      | —                                 |
| Other/unknown                               | 10                    | —                 | —                         | —                   | —                            | —                                      | —                                 |
| <b>Diagnosis</b>                            |                       |                   |                           |                     |                              |  |                                   |
| Diabetes                                    | 172                   | 310               | 4.04                      | 45.62               | 11.27                        | 4.77                                   | 53.86                             |
| Glomerulonephritis                          | 381                   | 322               | 2.80                      | 22.54               | 8.02                         | 3.18                                   | 25.62                             |
| Hypertension                                | 239                   | 337               | 2.70                      | 24.11               | 8.92                         | 2.93                                   | 26.18                             |
| Polycystic kidney disease                   | 51                    | 338               | 2.94                      | 30.13               | 10.24                        | 3.18                                   | 32.63                             |
| Interstitial nephropathy                    | 58                    | 321               | 2.87                      | 21.4                | 7.43                         | 3.27                                   | 24.41                             |
| Obstructive nephropathy                     | 23                    | —                 | —                         | —                   | —                            | —                                      | —                                 |
| Other                                       | 117                   | 327               | 2.81                      | 22.95               | 8.16                         | 3.15                                   | 25.69                             |
| Unknown                                     | 360                   | 328               | 2.83                      | 25.61               | 9.02                         | 3.16                                   | 28.58                             |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update, 1988.



# Program expenditures

## Data

Expenditures for this section were obtained from the Medicare Automated Data Retrieval System (MADRS) at HCFA. MADRS is a system for linking 100 percent of each beneficiary's Part A and Part B expenditure records for each calendar year. Persons identified as ESRD beneficiaries from the ESRD Program Management and Medical Information System (PMMIS) were linked with MADRS for this analysis. At the time of this data report, complete data were available for the years 1984 through 1988.

Program expenditures include payments for all medical services for which Medicare beneficiaries are eligible. These services include inpatient hospital care, outpatient services (mostly dialysis), physician services, skilled nursing care, and home health care. Dialysis services, for the most part, are paid for under the composite rate methodology, which was approximately \$127 per dialysis session for the years included in this section. Because outpatient dialysis is a Part B service, Medicare pays 80 percent of the composite rate with the beneficiary or other third party payer responsible for the remaining 20 percent. About 7,000 of the over-18,000 patients who dialyze at home select Method II for billing of dialysis services. Under Method II, they may obtain dialysis supplies directly from the supplier and then may bill the Medicare carrier directly for those dialysis supplies. Dialysis expenditures for these persons will appear in the physician/supplier section. Under the Method I option, home dialysis supplies are obtained through the dialysis facilities which, in turn, bill the Medicare intermediary at the same composite rate as they bill for in-center dialysis.

Physician care, which is deemed to be part of the routine care of dialysis patients, is paid for on a capitation basis. From 1984 to 1986, the average amount for this physician care was \$188 per month; since 1986, the average rate has been \$173 per month. In addition, there are physician expenditures for nondialysis related care. Hospital care is paid for under the prospective payment system instituted by Medicare in October 1983. Under this system, Medicare pays a predetermined amount per hospital stay, depending on the diagnosis and/or procedure associated with the stay. For each hospital episode, lasting until there is a 90-day break between stays, the patient is responsible for a deductible, roughly equivalent to 1 day of a hospital stay. This amount was \$356 in 1984; by 1988, it had risen to \$520, and in 1989 to \$560.

Much of the Part B data in MADRS is aggregated to the calendar year level. Therefore, it is not possible to link expenditures with time intervals shorter than a calendar year. This presents a particular problem for the ESRD population because of the high turnover rate among patients. Each year a large percentage of patients have only a partial year of Medicare coverage due to the high rate of new patients entering the program and the high mortality rate. The descriptive tables shown in this section are based on all ESRD patients ever enrolled

during each of the years 1984 through 1988. It is important to remember that, for many patients, their expenditure experience represents less than an entire year's experience.

Another qualification on these expenditure data concerns the provisions of Medicare as a secondary payer. Beginning in 1981, Medicare became the secondary payer for care for ESRD patients in their first year of Medicare coverage, if they have another insurance carrier and if they are entitled to Medicare solely because of ESRD (i.e., not because of disability and not because they are 65 years of age or over). The extent of coverage of, and payment for, services by other payers is not well known because Medicare may not receive copies of bills for these services. Because of this problem, Tables 47 through 51 are based only on patients who have had Medicare coverage for at least 1 year prior to January 1, 1988.

Patients have been grouped in these tables according to four basic treatment categories, as in the chapter on hospitalization. These mutually exclusive and exhaustive groups are: (1) patients on dialysis during their entire coverage period within the observation year; (2) patients receiving a transplant during their coverage period during the observation year; (3) patients receiving a transplant prior to the observation year and maintaining a functioning graft throughout the observation year; and (4) patients receiving a transplant prior to the observation year but whose graft failed during the observation year.

## Results

Medicare program expenditures for the years 1984 through 1988 by patient treatment group and by type of service are shown in Table 46. Total expenditures increased from \$2,381 million in 1984 to \$3,749 million in 1988, an average annual increase of 12.0 percent. The number of persons ever enrolled during each year increased from 113,542 in 1984 to 161,084 in 1988, an average annual increase of 9.1 percent. Dialysis accounted for both the majority of patients and the bulk of program expenditures. In 1984, dialysis patients accounted for 82.5 percent of all patients and 83.5 percent of all program expenditures. By 1988, dialysis patients accounted for 78.0 percent of all patients and 81.7 percent of all program expenditures.

The next largest group, in terms of program expenditures, was persons receiving kidney transplants. In most years, they accounted for about 5.5 percent of all patients and 13.0 percent of program expenditures. Persons with a functioning graft were the fastest growing group of patients during this time period (see Incidence and Enrollment chapter). This group increased at an average annual rate of 19.6 percent (12,504 in 1984 and 25,603 in 1988). As a result, they increased as a percent of the total Medicare enrollment from 11.0 percent in 1984 to 15.9 percent in 1988. However, due to the fact that they were not on maintenance dialysis and that they were beyond the transplant year costs, they accounted for

only 3.2 percent of program expenditures in 1984, increasing to 4.2 percent in 1988. Finally, previously transplanted patients experiencing a graft failure accounted for only 1 percent of patients and about 1.5 percent of program expenditures.

In 1988, 46.0 percent of program expenditures (\$1,725 million) were accounted for by inpatient hospital stays. Outpatient billings (most of which were for maintenance dialysis) accounted for 33.6 percent of program expenditures (\$1,259 million). Physician/supplier billings (which included some home dialysis expenditures) accounted for 19.9 percent of expenditures (\$745 million) and the remaining 0.5 percent was due to skilled nursing facility and home health care use (\$19 million).

The distribution of expenditures by type of service varied greatly by treatment category. For dialysis patients, expenditures were closely divided between inpatient and outpatient categories (40.2 percent and 38.3 percent respectively), with an additional 21.0 percent due to physician/supplier billings. The other treatment categories were more heavily weighted toward inpatient stays. Inpatient stays accounted for 77.1 percent of the costs of transplant patients, 62.7 percent of the costs of functioning graft patients, and 57.7 percent of the costs of patients experiencing a graft failure.

The annual expenditure data expressed in terms of expenditures per enrolled person is shown in Table 47. Overall, Medicare expenditures per enrolled ESRD beneficiary increased from \$22,245 in 1984 to \$24,851 in 1988, an average annual increase of 2.8 percent. For dialysis patients, expenditures in 1984 and 1988 were \$23,390 and \$27,241, respectively. The increase in expenditures for dialysis patients was due mostly to increases in inpatient expenditures (5.6 percent average annual increase) and physician/supplier expenditures (7.3 average percent annual increase). Per capita expenditures for dialysis, represented by outpatient billings, remained essentially unchanged during this 4-year period. Per capita expenditures for transplant recipients increased from \$54,042 in 1984 to \$75,608 in 1988, an 8.8 percent annual rate of increase. Most of the increase in the costs of transplant patients was due to inpatient expenditures which increased at an annual rate of 10.6 percent, from \$38,562 in 1984 to \$57,667 in 1988. Outpatient expenditures, mainly representing dialysis costs prior to the transplant and dialysis costs for failed grafts, remained relatively constant during this 4-year period.

Per capita expenditures were lowest for patients with a functioning graft. In 1984, expenditures for this group were \$5,934, increasing to \$6,091 by 1988, an average annual increase of 0.7 percent. Inpatient expenditures decreased slightly for this group during this period. Physician/supplier costs increased at an annual rate of 6.7 percent, from \$1,099 in 1984 to \$1,427 in 1988. Patients experiencing a graft failure had expenditures of \$33,399 in 1984 and \$35,798 in 1988, an average annual increase of 1.7 percent. The increases were about the same for inpatient services (2.5 percent per year) and physician/supplier services (3.8 percent per year).

Tables 48, 49, 50, and 51 show per capita expenditures

by age, sex, race, and primary cause of renal failure for the four treatment groups: dialysis, transplant, functioning graft, and graft failure, respectively. The tables also show, in the parentheses, the average number of days of Medicare coverage for each subgroup (males, females, age groups, etc.). Average days of coverage tended to be much lower for dialysis patients than for the other three patient groups. In addition, due to higher mortality rates, days of coverage decreased markedly with age. Unadjusted per capita payments among dialysis patients tend to underestimate the relative payment amounts for this group. Therefore, Tables 48 through 51 include an additional column representing an annualized per capita payment estimate. This annualized estimate is a linear extrapolation of the basic per capita payments to a full year (365 days) of Medicare coverage.

Expenditures for dialysis patients (Table 48) increased moderately with age, from a low of \$26,147 for persons 35 to 44 years of age to \$27,898 for persons 75 years of age and over. However, this understates the relative costs because the average number of days of coverage decreases with age due to higher mortality rates. For instance, persons in the youngest two age groups averaged 351 days of coverage in 1988 while persons 75 years of age and older averaged 256 days of coverage. When the expenditures are annualized, age effects become more evident. Estimated annual per capita expenditures ranged from a low of \$27,627 among persons 15 to 24 years of age to a high of \$39,776 among persons 75 years of age and older—a 44.0 percent differential. Female beneficiaries had higher average expenditures than did male beneficiaries (\$28,235 and \$26,293, respectively), with higher levels in all four service categories. Among racial groups, expenditures ranged from a low of \$26,160 for Asian persons to a high of \$28,038 among American Indians. However, on an annualized basis, per capita expenditures were just slightly higher for black persons (\$32,620) than for Asians (\$32,042). Annualized per capita expenditures were virtually identical for white and American Indian beneficiaries, at \$34,251 and \$34,227, respectively. Persons whose renal failure was attributed to diabetic nephropathy had the highest expenditure level (\$30,732), primarily due to higher rates of inpatient service use, followed by persons whose renal failure was attributed to hypertensive nephropathy (\$28,283). On an annualized basis, diabetic nephropathy patient expenditures were \$41,240 and hypertensive patient expenditures were \$36,211. Persons with glomerulonephritis and polycystic kidney disease had annualized expenditure amounts of \$31,153 and \$32,979, respectively, while persons with interstitial and obstructive nephropathy had annualized expenditure amounts of \$29,965, and \$25,241, respectively.

Expenditures for transplant recipients (Table 49) were relatively constant across age groups, ranging from \$73,799 to \$76,843. The exception was persons 65-74 years of age for whom per capita expenditures were \$79,698, or \$2,855 higher than any other age group. Male and female beneficiaries had comparable expenditure levels (\$75,614 and \$75,601, respectively). American Indian transplant recipients had the lowest (\$69,443) and

black transplant recipients had the highest (\$78,801) per capita expenditures. The higher expenditure totals among black persons may be due, in part, to higher graft failure rates among black transplant recipients. Among diagnostic categories, persons whose renal failure was attributed to diabetes had the highest average expenditures (\$79,942), and persons with obstructive nephropathy had the next highest average expenditure (\$78,493). The lowest average expenditures were among persons whose renal failure was attributed to interstitial nephropathy (\$70,780), glomerulonephritis (\$73,290), and polycystic kidney disease (\$74,356).

Average expenditures for functioning graft patients (Table 50) ranged, by age, from a low of \$4,622 for persons 0 to 14 years of age to \$7,929 for persons 65 to 74 years of age. There was little difference in expenditures between male and female beneficiaries. Black beneficiaries had the highest average expenditures (\$7,305), followed by American Indian (\$6,466), white (\$5,884), and Asian (\$4,742) beneficiaries.

Table 50 also shows that persons whose renal failure was attributed to diabetic nephropathy had average expenditures which were about twice as great (\$10,860) as persons in all other diagnostic categories, except for hypertension. Persons whose renal failure was attributed

to hypertension had the second highest average expenditures (\$6,173).

Among graft failure patients (Table 51), per capita expenditures tended to increase with age from \$31,490 for persons 15 to 24 years of age to \$42,007 for persons 55 to 64 years of age. Female beneficiaries had average expenditures which were \$1,723 greater than male beneficiaries (\$36,879 and \$35,156, respectively). There was little difference in expenditures by race. Among diagnostic groups, the highest expenditures were for persons whose renal failure was attributed to diabetic nephropathy (\$46,781), with other groups ranging between \$33,008 and \$39,364.

**Table 46**  
**Medicare end stage renal disease program expenditures  
by patient treatment group: 1984-88**

| Treatment group          | 1984      | 1985      | 1986      | 1987      | 1988      | Percent Distribution 1988 | Average annual percent change 1984-88 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|---------------------------|---------------------------------------|
| Expenditures in millions |           |           |           |           |           |                           |                                       |
| <b>Total</b>             |           |           |           |           |           |                           |                                       |
| Number of patients       | 113,542   | 125,378   | 136,957   | 148,771   | 161,084   | 100.0                     | 9.1                                   |
| Expenditures             |           |           |           |           |           |                           |                                       |
| Total                    | \$2,381.2 | \$2,680.1 | \$3,108.6 | \$3,441.7 | \$3,748.5 | 100.0                     | 12.0                                  |
| Inpatient                | 1,030.3   | 1,215.7   | 1,434.9   | 1,565.4   | 1,725.2   | 46.0                      | 13.8                                  |
| Outpatient               | 918.0     | 957.3     | 1,076.6   | 1,177.4   | 1,259.0   | 33.6                      | 8.2                                   |
| Physician/supplier       | 421.4     | 492.5     | 581.1     | 682.0     | 745.3     | 19.9                      | 15.3                                  |
| Other <sup>1</sup>       | 11.7      | 14.7      | 16.0      | 17.0      | 18.8      | 0.5                       | 12.6                                  |
| <b>Dialysis</b>          |           |           |           |           |           |                           |                                       |
| Number of patients       | 93,695    | 101,951   | 109,060   | 116,858   | 125,724   | 78.0                      | 7.6                                   |
| Expenditures             |           |           |           |           |           |                           |                                       |
| Total                    | \$1,988.2 | \$2,204.8 | \$2,513.9 | \$2,796.6 | \$3,063.5 | 100.0                     | 11.4                                  |
| Inpatient                | 750.8     | 866.4     | 996.0     | 1,098.8   | 1,230.6   | 40.2                      | 13.1                                  |
| Outpatient               | 862.5     | 898.5     | 1,004.9   | 1,097.8   | 1,174.4   | 38.3                      | 8.0                                   |
| Physician/supplier       | 364.4     | 426.6     | 498.8     | 585.2     | 642.2     | 21.0                      | 15.2                                  |
| Other <sup>1</sup>       | 10.7      | 13.5      | 14.1      | 14.8      | 16.5      | 0.5                       | 11.4                                  |
| <b>Transplant</b>        |           |           |           |           |           |                           |                                       |
| Number of patients       | 6,312     | 7,026     | 8,274     | 8,235     | 8,114     | 5.0                       | 6.5                                   |
| Expenditures             |           |           |           |           |           |                           |                                       |
| Total                    | \$283.3   | \$353.9   | \$441.9   | \$457.0   | \$470.8   | 100.0                     | 13.5                                  |
| Inpatient                | 207.0     | 270.8     | 340.6     | 350.7     | 363.1     | 77.1                      | 15.1                                  |
| Outpatient               | 38.5      | 40.4      | 48.9      | 50.2      | 51.3      | 10.9                      | 7.4                                   |
| Physician/supplier       | 37.6      | 42.4      | 51.7      | 55.6      | 55.7      | 11.8                      | 10.3                                  |
| Other <sup>1</sup>       | 0.3       | 0.4       | 0.6       | 0.6       | 0.7       | 0.1                       | 23.6                                  |
| <b>Functioning graft</b> |           |           |           |           |           |                           |                                       |
| Number of patients       | 12,504    | 15,298    | 18,408    | 22,181    | 25,603    | 15.9                      | 19.6                                  |
| Expenditures             |           |           |           |           |           |                           |                                       |
| Total                    | \$75.4    | \$87.5    | \$113.3   | \$137.1   | \$157.3   | 100.0                     | 20.2                                  |
| Inpatient                | 52.9      | 59.5      | 75.7      | 86.7      | 98.6      | 62.7                      | 16.8                                  |
| Outpatient               | 8.2       | 9.6       | 12.9      | 17.0      | 20.1      | 12.8                      | 25.1                                  |
| Physician/supplier       | 13.7      | 17.7      | 23.6      | 32.0      | 36.9      | 23.5                      | 28.1                                  |
| Other <sup>1</sup>       | 0.6       | 0.8       | 1.1       | 1.4       | 1.6       | 1.0                       | 27.8                                  |
| <b>Graft failure</b>     |           |           |           |           |           |                           |                                       |
| Number of patients       | 1,031     | 1,103     | 1,215     | 1,497     | 1,643     | 1.0                       | 12.4                                  |
| Expenditures             |           |           |           |           |           |                           |                                       |
| Total                    | \$34.3    | \$33.8    | \$39.4    | \$51.0    | \$56.8    | 100.0                     | 13.4                                  |
| Inpatient                | 19.6      | 19.1      | 22.5      | 29.2      | 32.8      | 57.7                      | 13.7                                  |
| Outpatient               | 8.9       | 8.8       | 9.8       | 12.4      | 13.3      | 23.4                      | 10.6                                  |
| Physician/supplier       | 5.7       | 5.9       | 6.9       | 9.2       | 10.5      | 18.5                      | 16.5                                  |
| Other <sup>1</sup>       | 0.1       | 0.1       | 0.2       | 0.1       | 0.2       | 0.4                       | 18.9                                  |

<sup>1</sup>Other includes skilled nursing facility and home health services.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update, 1984-88.

**Table 47**  
**Medicare end stage renal disease program expenditures per patient**  
**by patient treatment group (excludes Medicare secondary payer patients)<sup>1</sup>: 1984-88**

| Treatment groups           | 1984     | 1985     | 1986     | 1987     | 1988     | Average annual percent change 1984-88 |
|----------------------------|----------|----------|----------|----------|----------|---------------------------------------|
| <b>Total</b>               |          |          |          |          |          |                                       |
| Number of patients         | 85,290   | 94,611   | 103,564  | 112,528  | 121,290  | 9.2                                   |
| Expenditures (per patient) | \$22,245 | \$22,575 | \$24,042 | \$24,656 | \$24,851 | 2.8                                   |
| Total                      |          |          |          |          |          |                                       |
| Inpatient                  | 9,263    | 9,785    | 10,680   | 10,858   | 11,119   | 4.7                                   |
| Outpatient                 | 8,887    | 8,435    | 8,669    | 8,731    | 8,612    | -0.8                                  |
| Physician/supplier         | 3,978    | 4,224    | 4,564    | 4,940    | 4,990    | 5.8                                   |
| Other <sup>2</sup>         | 116      | 131      | 129      | 127      | 130      | 2.9                                   |
| <b>Dialysis</b>            |          |          |          |          |          |                                       |
| Number of patients         | 70,185   | 76,556   | 81,981   | 87,644   | 92,963   | 7.3                                   |
| Expenditures (per patient) | \$23,390 | \$23,827 | \$25,478 | \$26,641 | \$27,241 | 3.9                                   |
| Total                      |          |          |          |          |          |                                       |
| Inpatient                  | 8,733    | 9,189    | 9,965    | 10,398   | 10,853   | 5.6                                   |
| Outpatient                 | 10,239   | 9,866    | 10,315   | 10,547   | 10,555   | 0.8                                   |
| Physician/supplier         | 4,288    | 4,624    | 5,054    | 5,553    | 5,685    | 7.3                                   |
| Other <sup>2</sup>         | 130      | 148      | 145      | 143      | 147      | 3.1                                   |
| <b>Transplant</b>          |          |          |          |          |          |                                       |
| Number of patients         | 2,947    | 3,306    | 3,900    | 3,786    | 3,850    | 6.9                                   |
| Expenditures (per patient) | \$54,042 | \$61,333 | \$67,617 | \$71,921 | \$75,608 | 8.8                                   |
| Total                      |          |          |          |          |          |                                       |
| Inpatient                  | 38,562   | 45,879   | 51,412   | 54,605   | 57,667   | 10.6                                  |
| Outpatient                 | 8,292    | 7,996    | 8,219    | 8,528    | 8,821    | 1.6                                   |
| Physician/supplier         | 7,134    | 7,386    | 7,887    | 8,686    | 9,006    | 6.0                                   |
| Other <sup>2</sup>         | 54       | 73       | 98       | 103      | 115      | 20.8                                  |
| <b>Functioning graft</b>   |          |          |          |          |          |                                       |
| Number of patients         | 11,275   | 13,788   | 16,627   | 19,811   | 23,076   | 19.6                                  |
| Expenditures (per patient) | \$5,934  | \$5,733  | \$6,160  | \$6,183  | \$6,091  | 0.7                                   |
| Total                      |          |          |          |          |          |                                       |
| Inpatient                  | 4,152    | 3,901    | 4,120    | 3,934    | 3,832    | -2.0                                  |
| Outpatient                 | 636      | 621      | 694      | 753      | 769      | 4.9                                   |
| Physician/supplier         | 1,099    | 1,157    | 1,287    | 1,430    | 1,427    | 6.7                                   |
| Other <sup>2</sup>         | 47       | 54       | 59       | 65       | 63       | 7.6                                   |
| <b>Graft failure</b>       |          |          |          |          |          |                                       |
| Number of patients         | 883      | 961      | 1,056    | 1,287    | 1,401    | 12.2                                  |
| Expenditures (per patient) | \$33,399 | \$31,173 | \$33,226 | \$34,813 | \$35,798 | 1.7                                   |
| Total                      |          |          |          |          |          |                                       |
| Inpatient                  | 18,898   | 17,519   | 19,085   | 20,009   | 20,870   | 2.5                                   |
| Outpatient                 | 8,756    | 8,120    | 8,151    | 8,488    | 8,275    | -1.4                                  |
| Physician/supplier         | 5,636    | 5,461    | 5,832    | 6,214    | 6,547    | 3.8                                   |
| Other <sup>2</sup>         | 110      | 73       | 158      | 102      | 106      | -0.9                                  |

<sup>1</sup>Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

<sup>2</sup>Other includes skilled nursing facility and home health services.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update, 1984-88.

**Table 48**  
**Medicare end stage renal disease program expenditures, by age, sex, race,  
and primary diagnosis: 1988 dialysis patients (excludes Medicare secondary payer patients)<sup>1</sup>**

| Age, sex, race, and<br>primary diagnosis | Number of<br>persons <sup>2</sup> | Expenditures per person |            |                        |       |          |            |
|--|-----------------------------------|-------------------------|------------|------------------------|-------|----------|------------|
|  |                                   | Inpatient               | Outpatient | Physician/<br>supplier | Other | Total    | Annualized |
| Total                                    | 92,963 (298)                      | \$10,853                | \$10,555   | \$5,685                | \$147 | \$27,241 | \$33,366   |
| <b>Age</b>                               |                                   |                         |            |                        |       |          |            |
| Under 15 years                           | 342 (349)                         | 11,088                  | 9,948      | 6,071                  | 19    | 27,125   | 28,369     |
| 15 - 24 years                            | 1,615 (353)                       | 9,501                   | 12,219     | 4,980                  | 19    | 26,719   | 27,627     |
| 25 - 34 years                            | 5,553 (344)                       | 8,995                   | 12,136     | 5,121                  | 52    | 26,305   | 27,911     |
| 35 - 44 years                            | 8,732 (341)                       | 8,778                   | 12,151     | 5,145                  | 74    | 26,147   | 27,987     |
| 45 - 54 years                            | 11,115 (333)                      | 9,131                   | 11,971     | 5,398                  | 95    | 26,594   | 29,150     |
| 55 - 64 years                            | 18,209 (314)                      | 9,892                   | 11,374     | 5,462                  | 132   | 26,860   | 31,223     |
| 65 - 74 years                            | 30,714 (276)                      | 12,036                  | 9,666      | 5,962                  | 189   | 27,852   | 36,833     |
| 75 years or over                         | 16,683 (256)                      | 12,702                  | 8,847      | 6,140                  | 210   | 27,898   | 39,776     |
| <b>Sex</b>                               |                                   |                         |            |                        |       |          |            |
| Male                                     | 47,596 (297)                      | 10,499                  | 10,167     | 5,499                  | 127   | 26,293   | 32,313     |
| Female                                   | 45,367 (300)                      | 11,224                  | 10,963     | 5,880                  | 169   | 28,235   | 34,353     |
| <b>Race</b>                              |                                   |                         |            |                        |       |          |            |
| Asian                                    | 1,241 (298)                       | 8,459                   | 12,489     | 5,126                  | 86    | 26,160   | 32,042     |
| Black                                    | 30,507 (313)                      | 10,889                  | 11,551     | 5,395                  | 138   | 27,973   | 32,620     |
| White                                    | 58,537 (289)                      | 11,015                  | 10,026     | 5,920                  | 157   | 27,119   | 34,251     |
| American Indian                          | 808 (299)                         | 11,564                  | 11,569     | 4,803                  | 102   | 28,038   | 34,227     |
| Other/unknown                            | 1,870 (333)                       | 6,492                   | 9,150      | 3,788                  | 54    | 19,484   | 21,356     |
| <b>Diagnosis</b>                         |                                   |                         |            |                        |       |          |            |
| Diabetes                                 | 19,422 (272)                      | 13,670                  | 10,115     | 6,671                  | 275   | 30,732   | 41,240     |
| Glomerulonephritis                       | 14,440 (317)                      | 9,470                   | 11,694     | 5,421                  | 77    | 26,662   | 31,153     |
| Hypertension                             | 25,201 (284)                      | 11,726                  | 10,548     | 5,861                  | 148   | 28,283   | 36,211     |
| Polycystic kidney disease                | 4,088 (327)                       | 8,575                   | 12,662     | 5,534                  | 74    | 26,845   | 32,979     |
| Interstitial nephropathy                 | 3,803 (306)                       | 10,642                  | 11,175     | 5,689                  | 153   | 27,659   | 29,965     |
| Obstructive nephropathy                  | 3,077 (301)                       | 10,059                  | 10,158     | 5,280                  | 138   | 25,635   | 25,241     |
| Other                                    | 4,240 (297)                       | 11,285                  | 10,250     | 5,801                  | 100   | 27,436   | 33,718     |
| Unknown                                  | 18,692 (322)                      | 8,390                   | 9,691      | 4,698                  | 96    | 22,876   | 25,931     |

<sup>1</sup>Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

<sup>2</sup>Average number of days of Medicare coverage shown in parentheses.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update.

**Table 49**  
**Medicare end stage renal disease program expenditures, by age, sex, race,  
and primary diagnosis: 1988 transplant patients (excludes Medicare secondary payer patients)<sup>1</sup>**

| Age, sex, race, and<br>primary diagnosis | Number of<br>persons <sup>2</sup> | Expenditures per person |            |                        |       |          |            |
|--|-----------------------------------|-------------------------|------------|------------------------|-------|----------|------------|
|  |                                   | Inpatient               | Outpatient | Physician/<br>supplier | Other | Total    | Annualized |
| Total                                    | 3,850 (350)                       | \$57,667                | \$8,821    | \$9,006                | \$115 | \$75,608 | \$78,848   |
| <b>Age</b>                               |                                   |                         |            |                        |       |          |            |
| Under 15 years                           | 108 (351)                         | 55,974                  | 7,859      | 12,159                 | 20    | 76,013   | 79,045     |
| 15 - 24 years                            | 319 (355)                         | 55,903                  | 9,311      | 8,560                  | 25    | 73,799   | 75,878     |
| 25 - 34 years                            | 839 (351)                         | 59,135                  | 8,855      | 8,749                  | 104   | 76,843   | 79,908     |
| 35 - 44 years                            | 1,020 (352)                       | 57,322                  | 8,736      | 8,618                  | 93    | 74,769   | 77,530     |
| 45 - 54 years                            | 820 (352)                         | 56,642                  | 8,985      | 9,094                  | 159   | 74,880   | 77,645     |
| 55 - 64 years                            | 558 (344)                         | 58,142                  | 8,498      | 9,319                  | 167   | 76,126   | 80,773     |
| 65 - 74 years                            | 179 (336)                         | 60,330                  | 9,173      | 10,053                 | 142   | 79,698   | 86,577     |
| 75 years or over                         | 7                                 | —                       | —          | —                      | —     | —        | —          |
| <b>Sex</b>                               |                                   |                         |            |                        |       |          |            |
| Male                                     | 2,251 (349)                       | 57,653                  | 8,811      | 9,041                  | 110   | 75,614   | 79,081     |
| Female                                   | 1,599 (351)                       | 57,686                  | 8,835      | 8,957                  | 123   | 75,601   | 78,616     |
| <b>Race</b>                              |                                   |                         |            |                        |       |          |            |
| Asian                                    | 81 (351)                          | 54,407                  | 9,303      | 9,076                  | 167   | 72,953   | 75,863     |
| Black                                    | 996 (354)                         | 61,444                  | 8,915      | 8,306                  | 136   | 78,801   | 81,250     |
| White                                    | 2,700 (349)                       | 56,420                  | 8,781      | 9,263                  | 106   | 74,569   | 77,988     |
| American Indian                          | 51 (347)                          | 52,274                  | 8,096      | 8,990                  | 83    | 69,443   | 73,045     |
| Other/unknown                            | 22                                | —                       | —          | —                      | —     | —        | —          |
| <b>Diagnosis</b>                         |                                   |                         |            |                        |       |          |            |
| Diabetes                                 | 576 (342)                         | 60,604                  | 8,512      | 10,561                 | 265   | 79,942   | 85,318     |
| Glomerulonephritis                       | 1,096 (354)                       | 55,862                  | 8,876      | 8,495                  | 57    | 73,290   | 75,566     |
| Hypertension                             | 613 (354)                         | 57,852                  | 8,940      | 8,620                  | 109   | 75,520   | 77,867     |
| Polycystic kidney disease                | 300 (354)                         | 56,853                  | 9,043      | 8,419                  | 42    | 74,356   | 75,630     |
| Interstitial nephropathy                 | 146 (357)                         | 53,198                  | 8,760      | 8,767                  | 55    | 70,780   | 76,666     |
| Obstructive nephropathy                  | 87 (344)                          | 60,773                  | 8,403      | 9,138                  | 179   | 78,493   | 83,801     |
| Other                                    | 320 (354)                         | 54,550                  | 9,332      | 8,764                  | 51    | 72,697   | 74,956     |
| Unknown                                  | 712 (344)                         | 60,190                  | 8,625      | 9,255                  | 152   | 78,221   | 82,996     |

<sup>1</sup>Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

<sup>2</sup>Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System; March 1990 update.

**Table 50**  
**Medicare end stage renal disease program expenditures, by age, sex, race,  
and primary diagnosis: 1988 functioning graft patients (excludes Medicare secondary payer patients)<sup>1</sup>**

| Age, sex, race, and<br>primary diagnosis | Number of<br>persons <sup>2</sup> | Expenditures per person |            |                        |       |         |            |
|--|-----------------------------------|-------------------------|------------|------------------------|-------|---------|------------|
|  |                                   | Inpatient               | Outpatient | Physician/<br>supplier | Other | Total   | Annualized |
| Total                                    | 23,076 (345)                      | \$3,832                 | \$769      | \$1,427                | \$63  | \$6,091 | \$6,444    |
| <b>Age</b>                               |                                   |                         |            |                        |       |         |            |
| Under 15 years                           | 591 (336)                         | 2,713                   | 920        | 981                    | 8     | 4,622   | 5,021      |
| 15 - 24 years                            | 1,835 (342)                       | 2,877                   | 834        | 1,003                  | 7     | 4,721   | 5,038      |
| 25 - 34 years                            | 5,422 (345)                       | 3,529                   | 699        | 1,180                  | 36    | 5,444   | 5,760      |
| 35 - 44 years                            | 6,503 (347)                       | 3,757                   | 720        | 1,380                  | 73    | 5,930   | 6,238      |
| 45 - 54 years                            | 4,976 (344)                       | 4,207                   | 810        | 1,624                  | 82    | 6,722   | 7,132      |
| 55 - 64 years                            | 2,999 (346)                       | 4,507                   | 833        | 1,852                  | 88    | 7,280   | 7,680      |
| 65 - 74 years                            | 711 (348)                         | 4,838                   | 906        | 2,055                  | 130   | 7,929   | 8,316      |
| 75 years or over                         | 39 (335)                          | 2,204                   | 603        | 1,058                  | 8     | 3,872   | 4,219      |
| <b>Sex</b>                               |                                   |                         |            |                        |       |         |            |
| Male                                     | 14,337 (345)                      | 3,862                   | 751        | 1,409                  | 58    | 6,080   | 6,432      |
| Female                                   | 8,739 (345)                       | 3,783                   | 797        | 1,457                  | 71    | 6,108   | 6,462      |
| <b>Race</b>                              |                                   |                         |            |                        |       |         |            |
| Asian                                    | 419 (346)                         | 2,710                   | 827        | 1,179                  | 26    | 4,742   | 5,002      |
| Black                                    | 4,016 (349)                       | 4,798                   | 895        | 1,547                  | 65    | 7,305   | 7,640      |
| White                                    | 18,208 (344)                      | 3,660                   | 745        | 1,415                  | 64    | 5,884   | 6,243      |
| American Indian                          | 186 (356)                         | 4,366                   | 725        | 1,318                  | 58    | 6,466   | 6,629      |
| Other/unknown                            | 247 (354)                         | 2,331                   | 377        | 844                    | 18    | 3,570   | 3,681      |
| <b>Diagnosis</b>                         |                                   |                         |            |                        |       |         |            |
| Diabetes                                 | 3,871 (345)                       | 7,292                   | 993        | 2,383                  | 191   | 10,860  | 11,490     |
| Glomerulonephritis                       | 6,398 (345)                       | 2,789                   | 703        | 1,132                  | 27    | 4,652   | 4,930      |
| Hypertension                             | 2,473 (349)                       | 3,847                   | 848        | 1,429                  | 50    | 6,173   | 6,456      |
| Polycystic kidney disease                | 1,505 (345)                       | 3,031                   | 788        | 1,425                  | 18    | 5,262   | 5,197      |
| Interstitial nephropathy                 | 997 (347)                         | 2,957                   | 764        | 1,258                  | 34    | 5,014   | 5,567      |
| Obstructive nephropathy                  | 712 (347)                         | 3,225                   | 746        | 1,121                  | 46    | 5,138   | 5,668      |
| Other                                    | 1,455 (340)                       | 2,776                   | 816        | 1,065                  | 9     | 4,666   | 5,009      |
| Unknown                                  | 5,665 (345)                       | 3,353                   | 641        | 1,268                  | 55    | 5,316   | 5,624      |

<sup>1</sup>Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

<sup>2</sup>Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update.

**Table 51**  
**Medicare end stage renal disease program expenditures, by age, sex, race,  
and primary diagnosis: 1988 graft failure patients (excludes Medicare secondary payer patients)<sup>1</sup>**

| Age, sex, race, and<br>primary diagnosis | Number of<br>persons <sup>2</sup> | Expenditures per person |            |                        |       |          |            |
|--|-----------------------------------|-------------------------|------------|------------------------|-------|----------|------------|
|  |                                   | Inpatient               | Outpatient | Physician/<br>supplier | Other | Total    | Annualized |
| Total                                    | 1,401 (326)                       | \$20,870                | \$8,275    | \$6,547                | \$106 | \$35,798 | \$40,081   |
| <b>Age</b>                               |                                   |                         |            |                        |       |          |            |
| Under 15 years                           | 37 (343)                          | 29,373                  | 9,198      | 7,591                  | 42    | 46,204   | 49,168     |
| 15 - 24 years                            | 204 (328)                         | 17,467                  | 8,394      | 5,609                  | 19    | 31,490   | 35,042     |
| 25 - 34 years                            | 364 (338)                         | 21,894                  | 8,321      | 6,398                  | 91    | 36,703   | 39,635     |
| 35 - 44 years                            | 387 (323)                         | 20,007                  | 8,006      | 6,845                  | 119   | 34,977   | 39,525     |
| 45 - 54 years                            | 247 (309)                         | 19,252                  | 8,214      | 5,947                  | 159   | 33,572   | 39,656     |
| 55 - 64 years                            | 133 (324)                         | 25,647                  | 8,190      | 8,029                  | 141   | 42,007   | 47,323     |
| 65 - 74 years                            | 29                                | —                       | —          | —                      | —     | —        | —          |
| 75 years or over                         | 0                                 | —                       | —          | —                      | —     | —        | —          |
| <b>Sex</b>                               |                                   |                         |            |                        |       |          |            |
| Male                                     | 879 (330)                         | 20,280                  | 8,388      | 6,408                  | 80    | 35,156   | 38,885     |
| Female                                   | 522 (318)                         | 21,863                  | 8,084      | 6,782                  | 150   | 36,879   | 42,330     |
| <b>Race</b>                              |                                   |                         |            |                        |       |          |            |
| Asian                                    | 20                                | —                       | —          | —                      | —     | —        | —          |
| Black                                    | 440 (342)                         | 21,226                  | 8,913      | 6,201                  | 86    | 36,427   | 38,877     |
| White                                    | 913 (318)                         | 20,744                  | 7,987      | 6,802                  | 121   | 35,654   | 40,924     |
| American Indian                          | 18                                | —                       | —          | —                      | —     | —        | —          |
| Other/unknown                            | 10                                | —                       | —          | —                      | —     | —        | —          |
| <b>Diagnosis</b>                         |                                   |                         |            |                        |       |          |            |
| Diabetes                                 | 172 (310)                         | 29,209                  | 7,651      | 9,608                  | 313   | 46,781   | 55,081     |
| Glomerulonephritis                       | 381 (322)                         | 18,653                  | 8,289      | 6,006                  | 60    | 33,008   | 37,444     |
| Hypertension                             | 239 (337)                         | 19,233                  | 9,062      | 6,349                  | 105   | 34,750   | 37,609     |
| Poly cystic kidney disease               | 51 (338)                          | 23,033                  | 9,375      | 6,876                  | 80    | 39,364   | 39,943     |
| Interstitial nephropathy                 | 58 (321)                          | 18,561                  | 9,088      | 6,480                  | 4     | 34,113   | 42,508     |
| Obstructive nephropathy                  | 23                                | —                       | —          | —                      | —     | —        | —          |
| Other                                    | 117 (327)                         | 20,129                  | 7,683      | 5,925                  | 63    | 33,800   | 37,728     |
| Unknown                                  | 360 (328)                         | 20,461                  | 7,808      | 5,950                  | 87    | 34,306   | 38,176     |

<sup>1</sup>Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

<sup>2</sup>Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, March 1990 update.



# Providers of renal care

This section discusses the growth in the number of participating renal providers furnishing some form of service to end stage renal disease (ESRD) patients. For the purpose of this report, the following definitions apply. "Dialysis facility" refers to all providers approved by Medicare to furnish at least one type of dialysis service. A "dialysis center" is a hospital-based unit which, in addition to providing dialysis service(s), is also approved to furnish the full spectrum of diagnostic, therapeutic, and rehabilitative services. The term "transplant center" includes all hospitals approved to do kidney transplants. The term "renal provider" encompasses all of the units described above.

## Growth in numbers and types of renal providers

Since the Medicare ESRD program began in 1973, the total number of Medicare-approved renal providers has more than tripled from 606 in 1973 to 1,938 in December 1989. However, since 1985, the increase in total numbers of renal providers has remained relatively constant at about 7 percent annually. Rates of increase calculated from the data in Table 52 show that the increase in 1989 was 6.5 percent; in 1988 it was 6.9 percent; in 1987, 7.8 percent and in 1986 it was 7.9 percent.

The specific increase in the number of dialysis facilities has been primarily among freestanding facilities; i.e., facilities not affiliated with hospitals. In 1973 there were only about 68 freestanding facilities, which represented about 11 percent of the total number of Medicare-approved dialysis facilities in operation at that time. At the end of 1989, there were 1,164 freestanding dialysis facilities, which represented about 60 percent of the total. Again, however, the rate of increase has leveled over the last 4 years. Rates of increase for freestanding dialysis facilities calculated

from the data in Table 52 show that the increase in 1989 was 9.2 percent; in 1988 it was 11 percent; in 1987 it was 11.5 percent; and in 1986 it was 15.1 percent.

Data in Table 53 show that, in 1989, renal providers were almost split evenly between proprietary and nonprofit (51.5 and 48.5 percent, respectively). The clear trend is that, while the number of providers in both groups is increasing each year, the proprietary organizations are increasing at a faster rate.

Specifically, from 1988 to 1989, the number of proprietary renal providers increased 10.1 percent, but the number of nonprofit organizations increased only 3 percent for the same period. From 1987 to 1988 these figures were 12.6 percent and 1.8 percent, respectively.

## Type of renal care provided

In 1989, 8,899 renal transplants were reported in Medicare-approved transplant centers. ESRD patients who do not receive kidney transplants receive dialysis care either at home or at one of the 1,830 dialysis facilities. These facilities may be in either a hospital setting (of which there were 169 dialysis facilities and 497 dialysis centers at the end of 1989) or a nonhospital setting (of which there were 1,164 at the end of 1989). As stated in footnote to Table 54, the categories will not add across to the total because some renal providers have both a transplant center and a dialysis facility. In fact, at the end of 1989, 165 of the 497 dialysis centers noted above were in hospitals that also had approved transplant centers. Finally, 55 other dialysis centers are defined as inpatient centers because they provide backup dialysis services only, and 20 percent or less of their dialysis service is provided on an outpatient basis. (These 55 centers are not included in the 1,830 outpatient dialysis providers described above.)

**Table 52**  
**Certified ESRD providers of service by type of service and  
 number of approved dialysis stations: 1980 through 1989**

| Year                        | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   | 1988   | 1989   |
|-----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Total providers             | 1,054  | 1,162  | 1,218  | 1,308  | 1,368  | 1,463  | 1,578  | 1,701  | 1,819  | 1,938  |
| Transplant hospitals        |        |        |        |        |        |        |        |        |        |        |
| Transplant center only      | 6      | 8      | 8      | 13     | 25     | 31     | 34     | 39     | 41     | 53     |
| Transplant/dialysis centers | 145    | 149    | 149    | 146    | 145    | 147    | 149    | 160    | 161    | 165    |
| Other hospitals/satellites  |        |        |        |        |        |        |        |        |        |        |
| Inpatient care only         | 7      | 11     | 39     | 49     | 53     | 52     | 45     | 42     | 44     | 55     |
| Dialysis centers            | 387    | 401    | 380    | 363    | 360    | 359    | 353    | 351    | 349    | 332    |
| Dialysis facilities         | 104    | 107    | 113    | 111    | 117    | 126    | 136    | 149    | 158    | 169    |
| Non-hospitals               |        |        |        |        |        |        |        |        |        |        |
| Dialysis facilities         | 405    | 486    | 529    | 626    | 668    | 748    | 861    | 960    | 1,066  | 1,164  |
| Total approved              |        |        |        |        |        |        |        |        |        |        |
| Outpatient stations         | 12,329 | 13,784 | 14,438 | 15,506 | 16,594 | 17,845 | 19,383 | 21,246 | 22,605 | 23,654 |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, 1989.

**Table 53**  
**Number and percent of certified end stage renal disease providers,  
 by type of ownership: 1985-89**

| Type of ownership | 1985   |         | 1986   |         | 1987   |         | 1988   |         | 1989   |         |
|-------------------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
|                   | Number | Percent |
| Total             | 1,463  | 100.0   | 1,578  | 100.0   | 1,701  | 100.0   | 1,819  | 100.0   | 1,938  | 100.0   |
| Proprietary       | 616    | 42.1    | 715    | 45.3    | 805    | 47.3    | 907    | 49.9    | 999    | 51.5    |
| Hospital-based    | 26     | 1.8     | 24     | 1.5     | 24     | 1.4     | 26     | 1.4     | 28     | 1.4     |
| Freestanding      | 590    | 40.3    | 691    | 43.8    | 781    | 45.9    | 881    | 48.4    | 971    | 50.1    |
| Nonprofit         | 847    | 57.9    | 863    | 54.7    | 896    | 52.7    | 912    | 50.1    | 939    | 48.5    |
| Hospital-based    | 689    | 47.1    | 693    | 43.9    | 717    | 42.2    | 727    | 40.0    | 746    | 38.5    |
| Freestanding      | 158    | 10.0    | 170    | 10.8    | 179    | 10.5    | 185    | 10.2    | 193    | 10.0    |

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, 1985-89.

**Table 54**  
**Certified end stage renal disease providers of service,  
and number of approved dialysis stations, by State: December 1989**

| State                | Total providers of service <sup>1</sup> | Hospital transplant centers | Outpatient dialysis facilities |          |              | Inpatient hospital dialysis centers | Approved dialysis stations total | Facilities training in self-dialysis |
|----------------------|---|-----------------------------|--------------------------------|----------|--------------|-------------------------------------|----------------------------------|--------------------------------------|
|                      |   |                             | Total                          | Hospital | Freestanding |                                     |                                  |                                      |
| Total                | 1,938                                   | 218                         | 1,830                          | 666      | 1,164        | 55                                  | 23,654                           | 1,231                                |
| Alabama              | 36                                      | 2                           | 35                             | 2        | 33           | 1                                   | 454                              | 26                                   |
| Alaska               | 3                                       | 0                           | 2                              | 0        | 2            | 1                                   | 15                               | 1                                    |
| Arizona              | 37                                      | 4                           | 35                             | 10       | 25           | 1                                   | 346                              | 27                                   |
| Arkansas             | 30                                      | 3                           | 29                             | 9        | 20           | 1                                   | 345                              | 22                                   |
| California           | 223                                     | 22                          | 206                            | 41       | 165          | 6                                   | 2,658                            | 154                                  |
| Colorado             | 17                                      | 3                           | 16                             | 5        | 11           | 0                                   | 206                              | 11                                   |
| Connecticut          | 17                                      | 2                           | 17                             | 14       | 3            | 0                                   | 184                              | 17                                   |
| Delaware             | 6                                       | 0                           | 5                              | 1        | 4            | 1                                   | 176                              | 3                                    |
| District of Columbia | 19                                      | 5                           | 19                             | 8        | 11           | 0                                   | 231                              | 8                                    |
| Florida              | 139                                     | 5                           | 134                            | 21       | 113          | 5                                   | 1,841                            | 78                                   |
| Georgia              | 75                                      | 6                           | 73                             | 13       | 60           | 0                                   | 1,027                            | 41                                   |
| Hawaii               | 11                                      | 1                           | 11                             | 7        | 4            | 0                                   | 129                              | 4                                    |
| Idaho                | 7                                       | 0                           | 7                              | 6        | 1            | 0                                   | 57                               | 3                                    |
| Illinois             | 82                                      | 8                           | 74                             | 32       | 42           | 7                                   | 1,061                            | 58                                   |
| Indiana              | 33                                      | 2                           | 32                             | 20       | 12           | 1                                   | 377                              | 23                                   |
| Iowa                 | 14                                      | 4                           | 13                             | 11       | 2            | 0                                   | 153                              | 13                                   |
| Kansas               | 16                                      | 2                           | 14                             | 1        | 13           | 1                                   | 203                              | 12                                   |
| Kentucky             | 24                                      | 3                           | 23                             | 7        | 16           | 0                                   | 228                              | 13                                   |
| Louisiana            | 64                                      | 7                           | 59                             | 7        | 52           | 1                                   | 758                              | 36                                   |
| Maine                | 6                                       | 1                           | 6                              | 4        | 2            | 0                                   | 58                               | 6                                    |
| Maryland             | 43                                      | 4                           | 41                             | 10       | 31           | 1                                   | 532                              | 29                                   |
| Massachusetts        | 32                                      | 10                          | 30                             | 18       | 12           | 0                                   | 340                              | 25                                   |
| Michigan             | 45                                      | 10                          | 41                             | 28       | 13           | 2                                   | 568                              | 31                                   |
| Minnesota            | 26                                      | 4                           | 26                             | 24       | 2            | 0                                   | 288                              | 8                                    |
| Mississippi          | 29                                      | 1                           | 29                             | 4        | 25           | 0                                   | 357                              | 8                                    |
| Missouri             | 48                                      | 9                           | 44                             | 20       | 24           | 3                                   | 501                              | 41                                   |
| Montana              | 6                                       | 0                           | 6                              | 5        | 1            | 0                                   | 49                               | 4                                    |
| Nebraska             | 13                                      | 3                           | 10                             | 8        | 2            | 2                                   | 81                               | 10                                   |
| Nevada               | 5                                       | 0                           | 5                              | 2        | 3            | 0                                   | 62                               | 4                                    |
| New Hampshire        | 5                                       | 0                           | 5                              | 2        | 3            | 0                                   | 46                               | 4                                    |
| New Jersey           | 34                                      | 3                           | 34                             | 25       | 9            | 0                                   | 601                              | 26                                   |
| New Mexico           | 18                                      | 2                           | 16                             | 8        | 8            | 0                                   | 152                              | 12                                   |
| New York             | 110                                     | 14                          | 110                            | 76       | 34           | 0                                   | 1,409                            | 81                                   |
| North Carolina       | 52                                      | 5                           | 52                             | 9        | 43           | 0                                   | 823                              | 23                                   |
| North Dakota         | 8                                       | 2                           | 7                              | 7        | 0            | 0                                   | 56                               | 4                                    |
| Ohio                 | 48                                      | 12                          | 48                             | 32       | 16           | 0                                   | 600                              | 35                                   |
| Oklahoma             | 27                                      | 6                           | 26                             | 19       | 7            | 0                                   | 239                              | 11                                   |
| Oregon               | 11                                      | 1                           | 11                             | 8        | 3            | 0                                   | 129                              | 9                                    |
| Pennsylvania         | 109                                     | 10                          | 93                             | 32       | 61           | 16                                  | 1,219                            | 78                                   |
| Puerto Rico          | 18                                      | 1                           | 18                             | 8        | 10           | 0                                   | 294                              | 9                                    |
| Rhode Island         | 6                                       | 0                           | 6                              | 2        | 4            | 0                                   | 103                              | 5                                    |
| South Carolina       | 46                                      | 1                           | 45                             | 1        | 44           | 1                                   | 557                              | 13                                   |
| South Dakota         | 8                                       | 0                           | 8                              | 8        | 0            | 0                                   | 47                               | 3                                    |
| Tennessee            | 55                                      | 7                           | 49                             | 4        | 45           | 0                                   | 628                              | 26                                   |
| Texas                | 135                                     | 15                          | 124                            | 23       | 101          | 3                                   | 2,050                            | 81                                   |
| Utah                 | 11                                      | 3                           | 10                             | 5        | 5            | 0                                   | 92                               | 6                                    |
| Vermont              | 1                                       | 1                           | 1                              | 1        | 0            | 0                                   | 14                               | 1                                    |
| Virgin Islands       | 1                                       | 0                           | 1                              | 1        | 0            | 0                                   | 9                                | 0                                    |
| Virginia             | 55                                      | 4                           | 54                             | 15       | 39           | 0                                   | 636                              | 36                                   |
| Washington           | 22                                      | 5                           | 19                             | 9        | 10           | 0                                   | 194                              | 12                                   |
| West Virginia        | 14                                      | 2                           | 14                             | 7        | 7            | 0                                   | 137                              | 10                                   |
| Wisconsin            | 34                                      | 3                           | 33                             | 24       | 9            | 1                                   | 314                              | 28                                   |
| Wyoming              | 1                                       | 0                           | 1                              | 0        | 1            | 0                                   | 7                                | 1                                    |
| American Samoa       | 1                                       | 0                           | 1                              | 1        | 0            | 0                                   | 2                                | 0                                    |
| Guam                 | 1                                       | 0                           | 1                              | 1        | 0            | 0                                   | 6                                | 1                                    |
| Mariana Islands      | 1                                       | 0                           | 1                              | 0        | 1            | 0                                   | 5                                | 0                                    |

<sup>1</sup>Categories do not add across to total because some hospital transplant centers also provide outpatient services and are counted again in that category.  
See Table 49 for a recap of the total in which categories do not overlap.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, December 1989.



# **End stage renal disease studies**

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## **Centers for Disease Control survey**

The Centers for Disease Control (CDC) annually surveys dialysis facilities using their Form 53.7, "National Surveillance of Dialysis - Associated Hepatitis and Other Diseases." The CDC form is mailed by the Health Care Financing Administration to Medicare dialysis facilities along with the HCFA-2744, End Stage Renal Disease Facility Survey. As CDC surveys are received, they are forwarded to CDC for appropriate analyses.

Following is an explanation of the contents of the report entitled, "National Surveillance of Dialysis-Associated Diseases in the United States, 1989."

## **National Surveillance of Dialysis-Associated Diseases in the United States, 1989**

by Miriam J. Alter, Ph.D. and Martin S. Favero, Ph.D.

In conjunction with the annual facility survey performed by the Health Care Financing Administration (HCFA) for calendar year 1989, the Centers for Disease Control (CDC) distributed by mail a questionnaire to all 1,867 chronic hemodialysis centers licensed by HCFA. The reported incidence and prevalence of hepatitis B virus (HBV) infection among patients and staff was measured by using hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs) as markers. Incidence was defined as the percentage of patients or staff present in the facility for at least 1 month in 1989 who became positive for HBsAg during 1989. Prevalence was defined as the percentage of patients or staff present in the facility during the first week of December 1989 who were positive for HBsAg or for anti-HBs. Estimates of the cumulative number of patients and staff members susceptible to HBV (eligible for hepatitis B vaccine) were obtained by subtracting the number of patients and staff members positive for HBsAg and anti-HBs reported in a similar survey performed in 1982 (prior to nationwide use of vaccine) from the total number of patients and staff members reported in 1989. Other data collected included:

- Management of HBsAg-positive patients.
- Frequency of HBsAg serologic screening.
- Use of hepatitis B vaccine.
- Incidence of non-A, non-B hepatitis among patients and staff.
- Occurrence of pyrogenic reactions and septicemia (number of reactions and their occurrence in clusters).
- Incidence and case fatality rate of dialysis dementia.
- Occurrence of new dialyzer syndrome.
- Use of bicarbonate or acetate dialysis.
- Number of patients on high flux dialysis.

- Practices associated with reuse of dialyzers, dialyzer caps, bloodlines, and transducer filters.
- Procedures for cleaning and disinfection.
- Number of patients undergoing chronic dialysis known to have human immunodeficiency virus (HIV) infection.

Questionnaires were returned by 1,726 centers, a response rate of 92 percent. These centers represented 122,734 patients and 32,486 staff members. All questionnaires were edited for accuracy and consistency of responses. When necessary, facilities were recontacted (approximately 700) for clarification of data. Data were analyzed with use of the chi square test and Fisher's exact test for differences in proportions. The Mantel-Haenszel combined odds ratio was used when adjustment of confounding variables was required. A *p* value less than .05 was considered significant.

Findings from the 1989 hepatitis survey showed that the incidence of HBV infection decreased by 97 percent among patients and by 96 percent among staff members, with the largest decline in both groups occurring between 1976 and 1980. Analysis of the survey data also showed that, from 1976 to 1983, a dramatic increase occurred in the percentage of centers that reported reuse of disposable dialyzers (18 percent to 52 percent). This percentage continued to increase and in 1989, 68 percent of the centers reported that they reused disposable dialyzers.

Please refer any questions or requests for this report to: Hepatitis Branch (Division of Viral and Rickettsial Diseases), or Nosocomial Infections Laboratory Branch (Hospital Infections Program), Center for Infectious Diseases, Centers for Disease Control, Atlanta, Georgia 30333.

## **Health Care Financing Administration grant activity summaries**

The Health Care Financing Administration is presently involved in many research activities that deal with or touch on the end stage renal disease program. These activities range from internal HCFA reviews to full-scope extramural studies that are covered under the grant or cooperative agreement process.

Summaries of these activities follow.

### **End Stage Renal Disease Nutritional Therapy Study**

Period: September 1984-August 1994  
Award: Interagency Agreement  
Agency: National Institutes of Health  
National Institute of Diabetes and  
Digestive and Kidney Disease  
Bethesda, Md. 20892  
Project Officer: Arne H. Anderson  
Officer: Division of Health Systems and  
Special Studies

**Mandate:** Omnibus Reconciliation Act of 1980  
(Public Law 96-499)

**Description:** In accordance with the congressional mandate, this study, known as the Modification of Diet in Renal Disease Study, is a multicenter cooperative clinical study designed to ascertain whether restriction of dietary protein and phosphorus and/or reduction of blood pressure well below the currently accepted target of 140/90 will reduce the rate of progression of chronic renal disease regardless of the nature of the primary underlying process. The study is being conducted jointly by the National Institutes of Health (NIH) and the Health Care Financing Administration (HCFA).

**Status:** Phase I, the developmental phase, began in September 1984 and ended in December 1985. This phase produced a clinical protocol, forms manual, and operation manual. Phase II, a 2-year pilot study, began in January 1986 at 9 clinical sites. Phase III, the full-scale clinical study, began in January 1989 at 15 clinical sites and is to run until December 31, 1992. At the conclusion of this phase, NIH will determine to what extent the dietary restrictions and blood pressure reduction result in a reduced rate of progression of chronic renal disease. HCFA is responsible for conducting the cost-effectiveness component of the study if the therapy is found to be effective. The following questions will be addressed in the cost analysis to be conducted by HCFA:

- Is nutritional therapy cost effective in the treatment of patients in the study?
- Is nutritional therapy less costly to HCFA than the current payment for dialysis and transplantation?
- Is payment for nutritional therapy under HCFA administratively feasible?
- Can the therapy be effectively managed?

#### Cause and Failure to Transplant Cadaveric Human Organs

**Project No.:** 17-C-98728/1  
**Period:** August 1986-July 1989  
**Funding:** \$ 699,740  
**Award:** Cooperative Agreement  
**Awardee:** Brandeis University  
415 South Street  
Waltham, Mass. 02254  
**Project Officer:** Paul W. Eggers  
**Officer:** Division of Beneficiary Studies  
**Mandate:** National Organ Transplant Act  
(Public Law 98-507)

**Description:** This project examined the reasons for the high rate of wastage of cadaveric kidneys in the United States.

**Status:** Data collection began on January 1, 1988, and continued through December 31, 1988. At the end of the

study, data were available on 3,503 kidneys with discard information on 181 kidneys. A draft final report was received in the Office of Research and Demonstrations in June 1990. The final report is available from the National Technical Information Service. Major findings include:

- The overall wastage rate in 1988 was 5 percent, down considerably from the 20-percent rate in 1980.
- Reasons for failure to transplant were anatomical abnormalities, 17 percent; donor and organ pathologies, 32 percent; surgical complications, 11 percent; preservation and perfusion problems, 9 percent; and all other reasons, 31 percent.

#### Cost and Outcomes from Different End Stage Renal Disease Treatment Modalities

**Project No.:** 500-90-0050  
**Period:** September 1990-December 1991  
**Funding:** \$ 200,039  
**Award:** Contract  
**Contractor:** The Urban Institute  
2100 M Street, NW., Suite 400  
Washington, D.C. 20037  
**Project Officer:** Joel Greer  
**Officer:** Division of Beneficiary Studies  
**Mandate:** Omnibus Budget Reconciliation Act of 1986  
(Public Law 99-509)

**Description:** The project will study the cost effectiveness of different treatment regimens for end stage renal disease (ESRD) and will compare quality of life indicators for these regimens. It is generally believed that transplant patients do better and have lower medical costs than do dialysis patients. However, the cost of dialysis and physician oversight of dialysis patients has been tightly controlled. Transplant costs have risen because of inflation in hospital services and in the use of more expensive immunosuppressive drugs. Therefore, the relative cost effectiveness of transplantation compared to dialysis may have decreased. There is little consensus about the impacts of different dialysis modalities. Because of a shortage of cadaveric kidneys, medical contraindications, and graft rejections, many medical ESRD patients remain on dialysis. The outcomes and costs of the various dialysis therapies need to be explored. Using Health Care Financing Administration (HCFA) data, the contractor will estimate the economic impacts, compare hospitalization and mortality outcomes, and examine case mix and selection issues for alternative treatment modalities. The results of these studies will be of use to practicing physicians who must guide ESRD patients toward the most appropriate modality and of use to the Congress and HCFA in formulating policy.

**Status:** The project is in the analysis stage.

## Predictors of Cost and Success in Kidney and Heart Transplantation

Project No.: 17-C-99183/0

Period: June 1988-February 1991

Funding: \$ 235,118

Award: Cooperative Agreement

Awardee: Battelle Human Affairs Research Centers  
4000 NE. 41st Street  
Seattle, Wash. 98105

Project Officer: Lawrence E. Kucken  
Division of Beneficiary Studies

Description: This project will examine the patient and organizational characteristics that determine successful kidney and heart transplantation outcomes. Using multivariate life-table methods, data from the Medicare program will be combined with information from surveys of transplant facilities to construct a model of transplant facility effectiveness.

Status: The project is in the final report stage.

## Review of the First Year of Medicare Coverage of Erythropoietin

Project No.: 500-90-0051

Period: September 1990-December 1991

Funding: \$ 222,627

Award: Contract

Contractor: The Johns Hopkins University  
Program for Medical Technology and  
Practice Assessment  
1830 East Monument Street, Room 8061  
Baltimore, Md. 21205

Project Officer: Joel Greer  
Division of Beneficiary Studies

Mandate: Omnibus Budget Reconciliation Act  
of 1986  
(Public Law 99-509)

Description: The Health Care Financing Administration (HCFA) began covering human recombinant erythropoietin (EPO) in June 1989, 1 month after the drug was approved by the Food and Drug Administration. This study will examine usage patterns, costs, outcomes, and cost effectiveness of EPO following its coverage by HCFA. The impacts of HCFA's reimbursement policies on EPO access, dosage, costs, and burden sharing will be examined, and the effects of payment policies will be analyzed. EPO is produced by normally functioning kidneys to regulate the amount of oxygen-carrying red blood cells. Dialysis patients usually have low hematocrits and many suffer from symptoms of anemia such as malaise, shortness of breath, and an inability to work or exercise. Prior to EPO, blood transfusions were the main form of treatment. According to clinical trials, EPO can cure anemia in over 90 percent of dialysis patients, but it

must be taken continually to prevent recurrence. EPO costs Medicare an estimated \$200 million per year, and the use of EPO continues to increase. Furthermore, preliminary data indicate that only 40-45 percent of EPO recipients are reaching their target hematocrits. This study will document the diffusion of EPO among the dialysis population; examine outcome measures including hematocrits, hospitalizations, and mortality; estimate the costs; and project the impacts of alternative payment policies.

Status: The project is in the analysis stage.

## Impact of Payment Changes on Medicare: Case of End Stage Renal Disease

Project No.: 17-C-99021/3

Period: June 1987-June 1990

Funding: \$ 510,000

Award: Cooperative Agreement

Awardee: The Urban Institute  
Health Policy Center  
2100 M Street, NW  
Washington, D.C. 20037

Project Officer: Carl E. Josephson  
Division of Program Studies

Mandate: Omnibus Budget Reconciliation Act  
of 1986  
(Public Law 99-509)

Description: This project was part of an ongoing effort to monitor several components of Medicare's end stage renal disease (ESRD) program. The major thrust of this project was to measure the impact of two recent reductions in the composite payment rate on access to and quality of care provided to ESRD patients. Information for this study was derived from summaries of medical care records and other supplementary sources for past patients in both hospital-based and free-standing dialysis centers. The initial effort concentrated on assessing the impact of the \$12 reduction of the composite rate in 1983. This task included analysis of morbidity and mortality associated with ESRD, in concert with the study mandated by Congress in Section 9335(b)(2) of Public Law 99-509. As soon as the data became available, the same protocol was followed to measure the impact of the additional \$2-composite rate reduction instituted in 1986. The project also addressed numerous economic, policy, and epidemiological issues related to the administration and evaluation of the Medicare end stage renal disease program.

Status: This project has been completed and resulted in several publications, papers, and presentations. An interim project report, "The Impact of the Changes in the End Stage Renal Disease Composite Rate," was included in a Report to Congress and is available from the Superintendent of Documents, U. S. Government Printing

Office, stock number 017-060-00311-1. The cost is \$10.00 domestic; \$12.50 foreign. Among the formal publications emanating from this study are: (1) "Mortality and Duration of Hemodialysis Treatment," ((2) "The Medicare Cost of Renal Dialysis: Evidence from a Statistical Cost Function," (3) "Benign Moral Hazard and the Cost-Effectiveness Analysis of Insurance Coverage," (4) "Price of Dialysis, Unit Staffing, and Length of Dialysis Treatments," (5) "Five-Year Survival for End Stage Renal Disease Patients in the United States, Europe, and Japan, 1982 to 1987," (6) "The Impact of Nonidentical ABO Cadaveric Renal Transplantation on Waiting Times and Graft Survival," and (7) "Access to Kidney Transplantation: Has the United States Eliminated Income and Racial Differences?" The final project report will be available from the National Technical Information Service.

#### Study of the Medicare End Stage Renal Disease Program

Project No.: 14-C-99338/3  
Period: September 1988-June 1991  
Funding: \$1,719,890  
Award: Cooperative Agreement  
Awardee: National Academy of Sciences  
Institute of Medicine  
2101 Constitution Avenue, NW.  
Washington, D.C. 20418  
Project Officer: Carl E. Josephson  
Division of Program Studies  
Mandate: Omnibus Budget Reconciliation Act  
of 1987  
(Public Law 100-203)

Description: Section 403(d) of Public Law 100-203 mandates that the Secretary of Health and Human Services conduct a study to examine the following issues:

- Access to treatment both by individuals with chronic kidney failure eligible for Medicare benefits and by those not eligible for such benefits.
- Quality of care provided to end stage renal disease (ESRD) beneficiaries, as measured by clinical indicators, functional status of patients, and patient satisfaction.
- Effect of reimbursement on quality of treatment.
- Major epidemiological and demographic changes in the ESRD population that may affect access to treatment, quality of care, or the resource requirements of the program.
- Adequacy of existing data systems to monitor these matters on a continuing basis.

The Institute of Medicine (IOM) appointed a 16-member study committee to address the congressional mandate.

The committee met on several occasions during 1989 and 1990, hosted public hearings, solicited oral and written testimony, commissioned papers, and entered into subcontracts for analyses of data. Additional analyses of Medicare program data were performed by the IOM study staff.

Status: This project has been completed. The final report from this project has been published by the Institute of Medicine under the title, "Kidney Failure and the Federal Government." Copies of the final report are available from the National Academy Press at a cost of \$49.95 domestic. A 22-page summary, based on extracts from the complete report, is also available from the National Academy Press. The executive summary includes the study committee's major recommendations in the area of access, quality, reimbursement, data, epidemiology, and research.

#### End Stage Renal Disease Annual Research Report

Funding: Intramural  
Project: Paul W. Eggers  
Director: Division of Beneficiary Studies

Description: The annual reports are designed to produce a wide range of data and analyses regarding the end stage renal disease (ESRD) program. Much of the data in these reports emphasize trends and comparisons over time, making these reports standard reference sources illustrating changes in the nature of the Medicare ESRD population and in the pattern of treatment of this population.

Status: Published reports are:

- Health Care Financing Administration: *Research Report: End Stage Renal Disease, 1984*, HCFA Pub. No. 03221. Bureau of Data Management and Strategy. Washington. U.S. Government Printing Office, July 1986.
- Health Care Financing Administration: *Research Report: End Stage Renal Disease, 1985*, HCFA Pub. No. 03274. Bureau of Data Management and Strategy. Washington. U.S. Government Printing Office, September 1987.
- Health Care Financing Administration: *Research Report: End Stage Renal Disease, 1986*, HCFA Pub. No. 03268. Bureau of Data Management and Strategy. Washington. U.S. Government Printing Office, December 1988.
- Health Care Financing Administration: *Research Report: End Stage Renal Disease, 1987*, HCFA Pub. No. 03288. Bureau of Data Management and Strategy. Washington. U.S. Government Printing Office, September 1989.

*Report: End Stage Renal Disease, 1988, HCFA*  
Pub. No. 03299. Bureau of Data Management and  
Strategy. Washington. U.S. Government Printing  
Office, September 1990.

While supplies last, complimentary copies of these reports  
are available from the Health Care Financing  
Administration, Bureau of Data Management and Strategy,  
Office of Statistics and Data Management, Division of  
Special Programs, Third Floor, Security Office Park  
Building 6325 Security Boulevard, Baltimore, Maryland  
21207. Telephone requests can be made to  
(301) 597-3933.



## **Appendix A**

### **Glossary of terms**

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**Access device** - A piece of equipment or a mechanism designed to provide access to the patient's bloodstream (for hemodialysis) or to the peritoneal membrane (for peritoneal dialysis).

**Agreement** - A written document executed between an ESRD facility and another facility in which the other facility agrees to assume responsibility for furnishing specified services to patients and for obtaining reimbursement for those services.

**Arrangement** - A written document executed between an ESRD facility and another facility in which the other facility agrees to furnish specified services to patients but the ESRD facility retains responsibility for those services and for obtaining reimbursement for them.

**Backup dialysis** - A dialysis session furnished to an ESRD patient which is outside the patient's routine dialysis setting; e.g., a home patient dialyzing in the facility or an in-facility patient transferred to a backup facility.

**Backup hospital** - A hospital with which a dialysis facility has a written agreement under which inpatient hospital care or other hospital services are available promptly to the dialysis facility's patients when needed.

**Cadaveric transplant** - The surgical procedure of excising a kidney from a cadaver and implanting it into the patient.

**Centers by number of transplants** - Centers performing a specified number of transplants for the survey period.

**Chronic maintenance dialysis** - Dialysis regularly furnished to an ESRD patient in either a hospital-based, independent (non-hospital based), or home setting.

**Continuous ambulatory peritoneal dialysis (CAPD)** - A type of peritoneal dialysis in which the patient dialyzes at home, using special supplies, but without the need for a dialysis machine.

**Continuous cycling peritoneal dialysis (CCPD)** - A variant of CAPD in which a machine is used at home to make exchanges at night automatically.

**Dialysis** - A process of maintaining the chemical balance of the blood when the kidneys have failed; specifically, a process by which dissolved substances are removed from the patient's body by diffusion from one fluid compartment to another across a semi-permeable membrane. The types of dialysis currently used are hemodialysis, intermittent peritoneal dialysis (IPD), continuous ambulatory peritoneal dialysis (CAPD), and continuous cycling peritoneal dialysis (CCPD).

**Dialysis center** - A hospital unit which is approved to furnish the full spectrum of diagnostic, therapeutic, and rehabilitative services required for the care of ESRD dialysis patients (including inpatient dialysis but excluding transplantation). Services may be furnished directly or under arrangement with another approved provider.

**Dialysis facility** - A unit (hospital-based or freestanding) which is approved to furnish dialysis service(s) directly to ESRD patients.

**Dialysis station** - The treatment area which is designed and equipped to provide adequate and safe dialysis therapy, as well as privacy and comfort for patients.

**Dialysis treatment** - One session of dialysis, either in a dialysis facility or at home.

**Dialysis treatments given (other than home)** - The times dialysis machines were used in a dialysis facility to provide patient treatments.

**Disposition of cadaveric kidneys** - The final disposition of acquired cadaveric kidneys (e.g., transplanted, used for research, or discarded).

**End stage renal disease (ESRD)** - That stage of renal impairment which is irreversible and permanent and requires dialysis or kidney transplantation to ameliorate uremic symptoms and maintain life.

**ESRD facility** - See dialysis facility.

**ESRD network** - An approved organized group of ESRD providers in a designated area which, by their type and location and because of local referral patterns, collectively furnish the necessary care for ESRD patients in the population served.

**ESRD patient** - A person with irreversible and permanent kidney failure.

**ESRD service** - Treatment or care (e.g., dialysis, transplantation, supplies) usually rendered to those diagnosed as having ESRD.

**Facilities/centers surveyed** - Individual facilities/centers completing the annual ESRD Facility Survey form.

**Hemodialysis** - A method of dialysis in which blood from a patient's body is circulated through an external device or machine and returned to the patient's bloodstream. Such an artificial kidney machine usually is designed to remove fluids and metabolic end products from the blood stream by placing the blood in contact with a semi-permeable membrane which is bathed on the

other side by an appropriate chemical solution referred to as dialysate.

**Home patients** - Those patients who maintain their own dialysis equipment and/or supplies at home and perform their own treatment alone or with assistance of a helper.

**Inpatient care only** - A renal dialysis center which performs backup services for dialysis facilities and performs 20 percent or less of its dialysis on an outpatient basis.

**Inpatient dialysis** - Dialysis which, because of medical necessity, is furnished to an ESRD patient on a temporary inpatient basis in a hospital.

**Intermittent peritoneal dialysis (IPD)** - A procedure that introduces dialysate into the abdominal cavity to remove waste products through the peritoneum (a membrane which surrounds the intestines and other organs in the abdominal cavity). It functions in a manner similar to that of the artificial semi-permeable membrane in the hemodialysis machine.

**In-unit (in-facility) patients** - Those patients whose self-dialysis or staff-assisted dialysis is performed in a dialysis unit or facility.

**Living-related donor transplant** - The surgical procedure of excising a kidney from a living relative of the patient and implanting it in the patient.

**Living-unrelated donor transplant** - The surgical procedure of excising a kidney from a living person not related to the patient and implanting it in the patient.

**Lost to followup (LTFU)** - A category of patients whose current status is unknown to the facility which at one time had been dialyzing/following the patient.

**Medicare ESRD beneficiary** - A person qualifying for Medicare by means of the renal disease provision of the law.

**Non-viable kidneys** - Cadaver kidneys that are not suitable for transplantation (may be used for research or discarded).

**Organ procurement** - The process of acquiring donor kidneys.

**Organ Procurement Agency (OPA)** - An organization which performs or coordinates the performance of all the following services: harvesting of donated kidneys; preservation of donated kidneys; transportation of donated kidneys; and maintenance of a system to locate prospective recipients for harvested organs.

**Outpatient dialysis** - Dialysis furnished on an outpatient basis at a renal dialysis center or facility. Outpatient dialysis includes staff-assisted dialysis and self-dialysis.

**Patients awaiting transplant** - Patients who are medically able to receive a transplant, have given consent for a transplant, and are on an active transplant list.

**Peritoneal dialysis** - See intermittent peritoneal dialysis.

**Program Management and Medical Information System (PMMIS)** - A computer-based system containing medical and demographic data that deals primarily with current Medicare-eligible ESRD patients but also maintains historical information on persons no longer classified as ESRD patients by reason of death or successful transplantation. In addition, it contains information on ESRD facilities and facility reimbursement.

**Provider number** - A six-digit number assigned by HCFA for the purposes of identification and billing.

**Receiving service** - Patients who receive either kidney dialysis or kidney transplant services.

**Renal dialysis center** - See dialysis center.

**Renal dialysis facility** - See dialysis facility.

**Renal network** - See ESRD network.

**Renal transplant center** - A hospital unit which is approved to furnish transplantation and other medical and surgical specialty services for the care of ESRD transplant patients, including inpatient dialysis furnished directly or under arrangement.

**Restarted dialysis** - A category of ESRD patients who were on chronic maintenance dialysis, left that treatment category for reasons other than a transplant (e.g., recovered kidney function), then returned to dialysis.

**Self-care services** - Services provided by a dialysis facility or center to patients who have been trained to perform self-dialysis.

**Self-dialysis** - Dialysis performed with little or no professional assistance by an ESRD patient who has completed an appropriate course of training.

**Self-dialysis patients** - Patients who have been trained in dialysis techniques and dialyze themselves in a dialysis facility or at home with little or no professional assistance.

**Self-dialysis training and home training** - Programs that train ESRD patients to perform self-dialysis in a dialysis facility or at home with little or no professional assistance and train other individuals to assist patients in performing self-dialysis or home dialysis.

**Special purpose facility** - A renal facility which is approved to furnish dialysis at special locations on a short-term basis to a group of dialysis patients otherwise

unable to obtain treatment in the geographical area. The special locations must be either special rehabilitative (including vacation) locations servicing ESRD patients temporarily residing there, or locations in need of ESRD facilities under emergency circumstances.

*Staff-assisted dialysis* - Dialysis performed by the staff of the renal dialysis center or facility.

*Started for first time ever* - A category of ESRD patients who have been newly diagnosed as having ESRD and have been stabilized on dialysis. During the survey period, these patients began their initial course of staff-assisted chronic maintenance dialysis or completed a course of self-dialysis training and began dialyzing at home or self-dialyzing at a facility.

*Survey period* - The period January 1 through December 31 of each year for which all ESRD facilities must complete a HCFA-2744, ESRD Facility Survey.

*Training services* - See self-dialysis training and home training.

*Transient patients* - Patients who are treated by facilities episodically (less than 51 percent of the survey period); e.g., vacationers.

*Transplant* - The surgical procedure that involves excising an organ from either a cadaver or a living donor and implanting it in the patient.

*Transplant center* - See renal transplant center.

*Transplants performed* - The number of kidneys transplanted by donor source type; i.e., living-related, living-unrelated, or cadaveric.

*Treatment setting* - The type and location of the dialysis treatment being performed; i.e., self-dialysis (in-unit or home), self-dialysis training, or staff-assisted dialysis.



## Appendix B

### Entitlement provisions

The 1972 Amendments to the Social Security Act extended Medicare coverage to individuals with end stage renal disease beginning July 1973, the month the law became effective. End stage renal disease is that stage of kidney impairment which is irreversible, cannot be controlled by conservative management alone, and requires dialysis or kidney transplantation to maintain life.

As soon as an individual knows that he needs maintenance dialysis treatments, he should apply for Medicare at any social security office. Social Security representatives will help the applicant furnish all necessary information and answer questions he may have about the Medicare program. One of the essential forms to be completed will be a HCFA-2728, Chronic Renal Disease Medical Evidence Report. Notification of entitlement will be mailed later. If a person cannot come to the Social Security office, arrangements can be made so that a representative can visit the person to take an application.

When entitlement to hospital insurance (Part A) is established, the individual is automatically enrolled for supplementary medical insurance (Part B) to begin the same month, unless he specifies he does not want this coverage.

It is not in the best interest of most persons with end stage renal disease to decline Part B coverage because many renal services, such as outpatient dialysis treatments, are covered only under Part B. A person qualifying for Medicare by means of the renal disease provision is eligible for the full range of benefits available under the health insurance program, not just for those services relating to renal care.

### Nature of 1978 amendments

The 1978 Amendments to the Social Security Act made a number of changes in the rules governing entitlement to Medicare based on end stage renal disease. The changes were designed to encourage self-dialysis and transplantation and to eliminate a number of inequities and difficulties that existed under previous law. The following changes became effective October 1, 1978:

- **Age 65 restriction removed**—Prior to October 1, 1978, persons 65 years of age or over were ineligible for Medicare based on end stage renal disease. This restriction has been eliminated.
- **Application requirement**—On claims for entitlement October 1, 1978 and later, an application must be filed, with retroactivity limited to no more than 12 months before the month of filing.
- **Early entitlement based on hospitalization for transplant surgery**—Entitlement may begin during a month in the qualifying period if, during that period, the individual

is hospitalized for transplant procedures, and the transplant takes place no later than 2 months thereafter.

- **Waiver of qualifying period based on self-dialysis training**—The qualifying period is waived for persons who during the qualifying period participate in self-dialysis training and are expected to complete the training successfully and self-dialyze thereafter.
- **36 months of post-transplant entitlement**—Entitlement terminates 36 months (rather than 12 months, as under previous law) after the month in which an individual undergoes kidney transplantation.
- **No second qualifying period after termination of R-HI (health insurance based on entitlement because of renal provision of the law)**—An individual whose entitlement to Medicare on the basis of ESRD has ended will be re-entitled as of the month his new course of dialysis begins, subject to the filing of a timely application.

### Requirements for eligibility

To qualify for Medicare under the renal provision, a person must have end stage renal disease and either: be entitled to a monthly insurance benefit under title II of the Social Security Act (or an annuity under the Railroad Retirement Act); or be fully or currently insured under Social Security (railroad work may count); or be the spouse or dependent child of a person who meets at least one of these last two requirements. There is no minimum age for eligibility under the renal disease provision. An application for Medicare must be filed (effective October 1, 1978).

### When entitlement begins

Provided all eligibility requirements are met, a person's Medicare entitlement based on the renal provision of the law begins with one of four occurrences.

- The third month after the month in which a course of dialysis is initiated. For example, if a course was initiated any time during the month of January, the date of entitlement would be April 1 (Table B-1).
- If earlier, the month a course of maintenance dialysis begins if the individual participates within the waiting period in a self-dialysis training program in an approved facility and is expected to complete the training successfully and self-dialyze thereafter (effective October 1, 1978).
- If earlier, the month of transplant.
- If earlier, the month an individual is admitted to an approved hospital for procedures preliminary to a transplant, if the transplant takes place within the following 2 months. If the transplant is delayed more than 2 months, Medicare coverage will begin the second month prior to the month the actual transplant takes place, or, if earlier, the first day of the third month after maintenance dialysis began (effective October 1, 1978).

**Table B-1**  
**Effective date chart for patients applying for ESRD benefits**

| Regular course of dialysis initiated | Date of entitlement |
|--------------------------------------|---------------------|
| January                              | April 1             |
| February                             | May 1               |
| March                                | June 1              |
| April                                | July 1              |
| May                                  | August 1            |
| June                                 | September 1         |
| July                                 | October 1           |
| August                               | November 1          |
| September                            | December 1          |
| October                              | January 1           |
| November                             | February 1          |
| December                             | March 1             |

#### **When entitlement ends**

A person's entitlement to this provision terminates with the earliest of the following events:

- The day of death; or
- The last day of the 12th month after a person no longer requires maintenance dialysis treatments; or
- The last day of the 36th month after the month in which the individual receives a kidney transplant. If within 36 months after transplantation the person requires another transplant or returns to dialysis, there is no interruption in entitlement (effective October 1, 1978).

## Appendix C

### End stage renal disease data sources

| Form title and number                      | Primary purpose  | PMMIS function  | Research potential  |
|--|--|---|---|
| Institutional Provider Billing HCFA-1450)  | Billing  | Dialysis incidence<br>Inpatient stay diagnosis                      | Prevalence and outcome analyses, morbidity.                                 |
| ESRD Transplant Information (HCFA-2745-U4) | Clinical information                                     | Transplant incidence  | Clinical research: Efficacy of treatment, prevalence, and outcome analyses. |
| ESRD Transplant Follow-up (no number)      | Clinical rehabilitative information                      | Patient and graft survival and rehabilitation                       | Clinical research: Efficacy of treatment and outcome analysis.              |
| ESRD Death Notification (HCFA-2746)        | Death incidence  | Death incidence, cause of death                                     | Outcome analyses.   |
| CRD Medical Evidence Report (HCFA-2728-U4) | Entitlement  | Identification of primary disease and first date of treatment       | Incidence and outcome analyses.   |
| ESRD Facility Survey (HCFA-2744)           | Number of Medicare and non-Medicare patients by modality | National overview of Medicare and non-Medicare patients by modality | Incidence, prevalence, and outcome analyses.                                |
| ESRD Beneficiary Selection (HCFA-382-U4)   | Billing  | Home dialysis   | Prevalence and outcome analyses.  |

NOTES: PMMIS is Program Management and Medical Information System. HCFA is Health Care Financing Administration. CRD is chronic renal disease. UB is uniform bill.



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